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Sent: Thursday, September 27, 2018 9:08 AM
To: Liscio, Matthew P CIV SEA 04, NAVSEA DET RASO [matthew.liscio@navy.mil]
CC: Howard, Leslie A CIV NAVFAC SW [leslie.howard@navy.mil]; Fowler, Janet CIV NAVSEA, SEA 04N [janet.fowler1@navy.mil]; Johnson, Nels [Nels.Johnson@aptim.com]; Schul, Raymond [raymond.schul@aptim.com]; Guillory, Jeffrey [jeffrey.guillory@aptim.com]; Amy Mangel [amy.mangel@aptim.com]; Hanelt, Norm [Norm.Hanelt@aptim.com]; Killpack, Randall [randall.killpack@aptim.com]; Chi, Minhsec [minhsec.chi@aptim.com]; Orman, Sean [sean.orman@aptim.com]; Rogers, Bryon [bryon.rogers@aptim.com]
Subject: [Non-DoD Source] Data package ready for review - HPNS PE-2, RSY D8 (DC)
Attachments: HPNS APTIM RSY D8 (DC) Soil Non-LLRW Concurrence Request 09272018 (reduced).pdf

Mr. Liscio,

APTIM request RASO concurrence to designate this soil as Non-LLRW soil.

If there are any questions or if additional data is required, please contact me.

Thank you.

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Summary

1) RSI gamma walkover survey and data review—upon review of initial scan data, follow-up static investigations were deemed necessary, and investigation locations were identified as per the RSI Data Evaluation Process (pages 3-4). Gamma scan coverage is shown on the Systematic Sample Survey map (page 8). Contour maps of scan data are shown on RSI Data Plots (page 5). Data review results are summarized on RSI Review Summary (page 6).

2) RSI Follow-up static survey—58 locations identified during the data review process were investigated. Eleven follow-up locations exceeded the Reference Area static IL for regions of interests (ROIs) 6, 7, and/or 8 (VD1). Follow-up locations are shown on the RSI Follow-up Static Survey map (page 7).

Note: Gamma readings reported in the Instrument and Survey Data table (page 1) for the gamma walkover and follow-up static surveys show the mean gamma gross count rate range(ROI 10, VD1) for all surveyed follow-up locations. Spectral analysis results show 11 follow-up locations exceeded the Reference Area Static IL for regions of interests (ROI) 6, 7, and/or 8. Biased samples were collected at five representative locations to support the evaluation of the elevated gamma readings.

Biased soil samples PE2-RSYD8-DC-B-S001-PE2-RSYD8-DC-B-S005 were collected and submitted for gamma spectroscopy analysis to further characterize the elevated soil readings at follow-up locations 4, 6, 17, 21, and 30 (see Summary Note 4 below).

3) Eighteen systematic soil samples (001-018) were obtained and submitted for gamma spectroscopy analysis. Sample locations for systematic samples are shown on the Systematic Sample Survey map (page 8). TestAmerica sample results are attached (pages 70-93).

Ten percent of the systematic soil samples (two samples in total, PE2-RSYD8-DC-S001 & PE2-RSYD8-DC-S011) were also analyzed for total strontium. Total Strontium results are also included in the TestAmerica sample results report (pages 70-93).

4) Biased sample survey—samples PE2-RSYD8-DC-B-S001-PE2-RSYD8-DC-B-S005 were obtained and analyzed to support the evaluation of elevated gamma readings collected at follow-up locations 4, 6, 17, 21, and 30. Biased soil sample location are shown on the Biased Sample Survey map (page 9). TestAmerica sample results are attached (pages 94-107).

Note: Static gamma measurements collected at systematic and biased sample locations were obtained with a handheld Ludlum 2221 Scaler/Ratemeter and 3"x3" NaI probe; the results show gamma readings exceeding the instrument-specific Reference Area Static IL at several sample locations. Sample results indicate that this activity is due to the presence of naturally-occurring non-Navy program radionuclides in the excavated soil.

Conclusions:

All locations with elevated Z-scores identified by the RSI gamma walkover survey were determined to be consistent with background. 58 locations were investigated during the follow-up static survey, with 11 readings greater than the Reference Area static IL. Biased soil samples were collected at five representative follow-up locations to support the evaluation of elevated gamma readings. Spectral analysis results and gamma static data for each region of interest (ROI) are provided (pages 10-67).

Final analytical results for systematic and biased samples from this RSY pad are concluded to be comparable to background. Histograms showing systematic soil sample activity concentrations are provided (pages 68-69). Ten percent of the systematic soil samples (two samples in total, PE2-RSYD8-DC-S001 & PE2-RSYD8-DC-S011) were also analyzed for total strontium, with concentrations less than the Project Action Limit of 0.331 pCi/g, as shown in the Soil Sample Data table (page 1).

This data package characterizes the construction base layer for RSY D8 pad. The soil was initially import clean material.

APTIM request RASO concurrence to release this soil as Non-LLRW.

Disposition: This soil shall be dispositioned as non-LLRW waste. The soil will be stockpiled onsite for reuse following appropriate chemical characterization.

RSI Data Evaluation Process

RS-700 Mobile Radiation Monitoring System

- Self-contained gamma-ray radiation detection and monitoring system
- (2) RSX-1 4-liter NaI(Tl) gamma detectors oriented perpendicular to the direction of travel (VD1 denotes both detectors summed; VD3 refers to the left detector; and VD4 refers to the right detector)
- Multi-Channel Analyzer, allowing for monitoring of energy-specific regions of interest (ROIs)
- RadAssist survey software for control, monitoring, and recording

Ten ROIs have been established for radium and progeny, cesium, and cobalt, as well as other naturally-occurring or anthropogenic gamma-emitting radionuclides that may be of interest:

ROI	Description	Energy Range (keV)	Primary Peak (keV)
1	Total counts	411 – 2811	N/A
2	Potassium	1371 – 1569	1460
3	U/Ra-226	1659 – 1860	1764 (Bi-214)
4	Thorium	2409 – 2811	2614 (Tl-208)
5	Annihilation	456 – 570	511
6	Ra-226	546 – 666	609 (Bi-214)
7	Cs-137	600 - 720	662
8	Pb-214/Ra-226	327 – 399	351
9	Co-60	1085 - 1370	1173/1332
10	Gross Counts	24 – 2811	N/A

A tiered approach is used during data review to identify follow-up locations. Raw data are exported to a comma delimited format using RadAssist and imported into an Excel spreadsheet for review and analysis. The following review steps are completed to determine if additional follow-up measurements are necessary:

- **Playback Review:** The data file is replayed in RadAssist and reviewed for elevated count rates in ROIs 6, 7, 9, and 10 for virtual detector (VD) 1 (both detectors summed). The scan screen is also monitored for elevated count rates and alarms.
- **Count Rate Time Series Review:** The count rates for ROIs 6, 7, 9, and 10 for VDs 1, 3 (detector 1), and 4 (detector 2) are plotted in a time series and reviewed for additional peaks in count rate.
- **All ROIs:**
 - **Z-Scores:** The Z-Scores are calculated for each location in all ROIs for VDs 1, 3, and 4. Any location with four or more ROIs having a Z-Score greater than three ($Z>3$) is marked for follow-up.
 - **Local Z-Scores:** Local Z-Scores are calculated using a moving average for each data point in all ROIs for VDs 1, 3, and 4 to identify elevated count rates where the background is variable (e.g. multiple surface types). Any location (in a survey unit that meets this condition) with four or more ROIs having a local $Z>3$ is marked for follow-up.
 - **Semi-local Z-Scores:** Semi-local Z-Scores are calculated using the global average, but with a moving average for the standard deviation for VDs 1, 3, and 4. This is used for survey data that have a consistent background but an area or areas of highly elevated count rates, in order to identify smaller areas of elevated count rates that may not otherwise be identified by the initial Z-score review. Any location (in a survey unit that meets this condition) with four or more ROIs having a semi-local $Z>3$ is marked for follow-up.
- **ROIs 3, 6, 8, and 10 (radium-specific ROIs):**
 - Z-Scores: The Z-Scores are calculated for each location in the radium-specific ROIs for VDs 1, 3, and 4. Any location with three or more radium-specific ROIs having a $Z>3$ is marked for follow-up.
 - Local Z-Scores: Local Z-Scores are calculated using a moving average for each data point in the radium-specific ROIs for VDs 1, 3, and 4 to identify elevated count rates where the background is variable (e.g. multiple surface types). Any location (in a survey unit that meets this condition) with three or more radium-specific ROIs having a local $Z>3$ is marked for follow-up.
 - Semi-local Z-Scores: Semi-local Z-Scores are calculated using the global average, but with a moving average for the standard deviation for VDs 1, 3, and 4. This is used for survey data that have a consistent background but an area or areas of highly elevated count rates, in order to identify smaller areas of elevated count rates that may not otherwise

be identified by the initial Z-score review. Any location (in a survey unit that meets this condition) with three or more radium-specific ROIs having a semi-local $Z > 3$ is marked for follow-up.

- **ROI 7 (cesium-specific ROI):**
 - Z-Scores: Z-Scores are calculated for each location in ROI 7 for VDs 1, 3, and 4. Any location having a $Z > 3$ is marked for follow-up.
 - Local Z-Scores: Local Z-Scores are calculated using a moving average for each data point in ROI 7 for VDs 1, 3, and 4 to identify elevated count rates where the background is variable (e.g. multiple surface types). Any location (in a survey unit that meets this condition) having a local $Z > 3$ is marked for follow-up.
 - Semi-local Z-Scores: Semi-local Z-Scores are calculated using the global average, but with a moving average for the standard deviation in ROI 7 for VDs 1, 3, and 4. This is used for survey data that have a consistent background but an area or areas of highly elevated count rates, in order to identify smaller areas of elevated count rates that may not otherwise be identified by the initial Z-score review. Any location (in a survey unit that meets this condition) having a semi-local $Z > 3$ is marked for follow-up.
- **ROI 9 (cobalt-specific ROI):**
 - Z-Scores: Z-Scores are calculated for each location in ROI 9 for VDs 1, 3, and 4. Any location having a $Z > 3$ is marked for follow-up.
 - Local Z-Scores: Local Z-Scores are calculated using a moving average for each data point in ROI 9 for VDs 1, 3, and 4 to identify elevated count rates where the background is variable (e.g. multiple surface types). Any location (in a survey unit that meets this condition) having a local $Z > 3$ is marked for follow-up.
 - Semi-local Z-Scores: Semi-local Z-Scores are calculated using the global average, but with a moving average for the standard deviation in ROI 9 for VDs 1, 3, and 4. This is used for survey data that have a consistent background but an area or areas of highly elevated count rates, in order to identify smaller areas of elevated count rates that may not otherwise be identified by the initial Z-score review. Any location (in a survey unit that meets this condition) having a semi-local $Z > 3$ is marked for follow-up.
- **Z-Score Time Series Review:** The three types of Z-Scores for ROIs 6, 7, 9, and 10 for VDs 1, 3, and 4 are plotted in a time series and reviewed for additional peaks in Z-Scores.

Any location selected for follow-up or with a Z-Score > 3 in a radium-, cesium-, or cobalt-specific ROI will undergo spectral analysis to determine if it is statistically likely that there are ROC concentrations present at that location in quantities greater than background.

A background spectrum is subtracted from the local spectral data for a given location, and the resulting net spectrum is plotted. Critical levels, as defined in Section 6.7.1 of the Multi Agency Radiation Survey and Site Investigation Manual are calculated and plotted based on background levels. The critical level is the level, in counts, at which there is a statistical probability (with a predetermined confidence) of incorrectly identifying a measurement system background value as greater than background. Any response above this level is considered to be greater than background. The critical level is calculated for ROIs 6, 7, 8, and 9 according to the equation shown below:

Where:

$$L_C = 2.33\sqrt{B}$$

LC	=	critical level (counts)
B	=	average background in the ROI

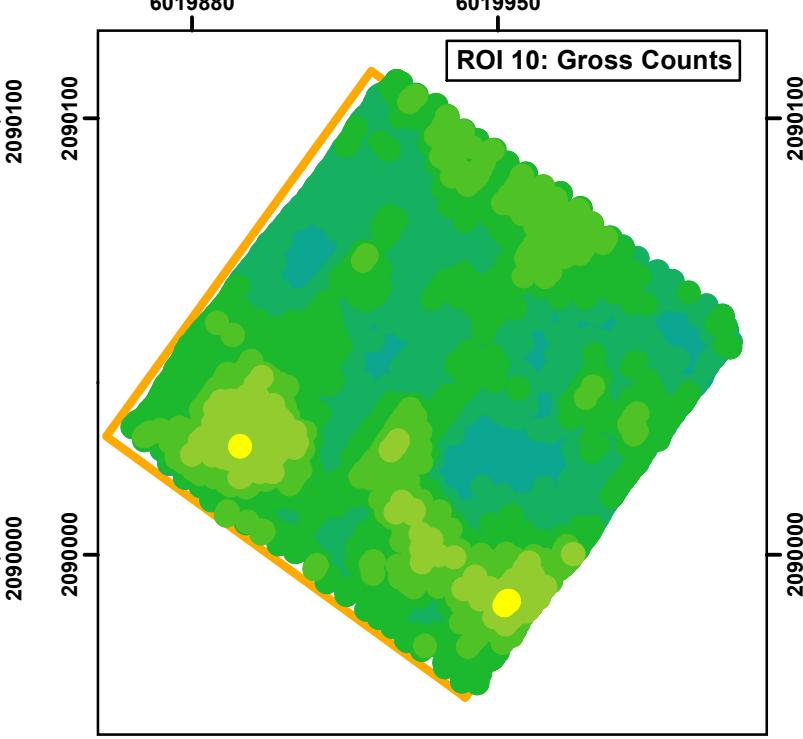
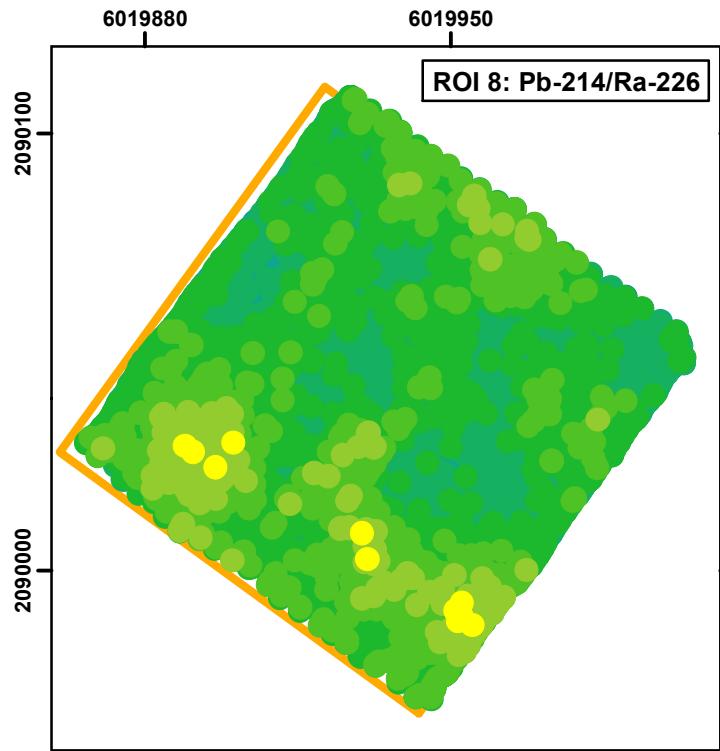
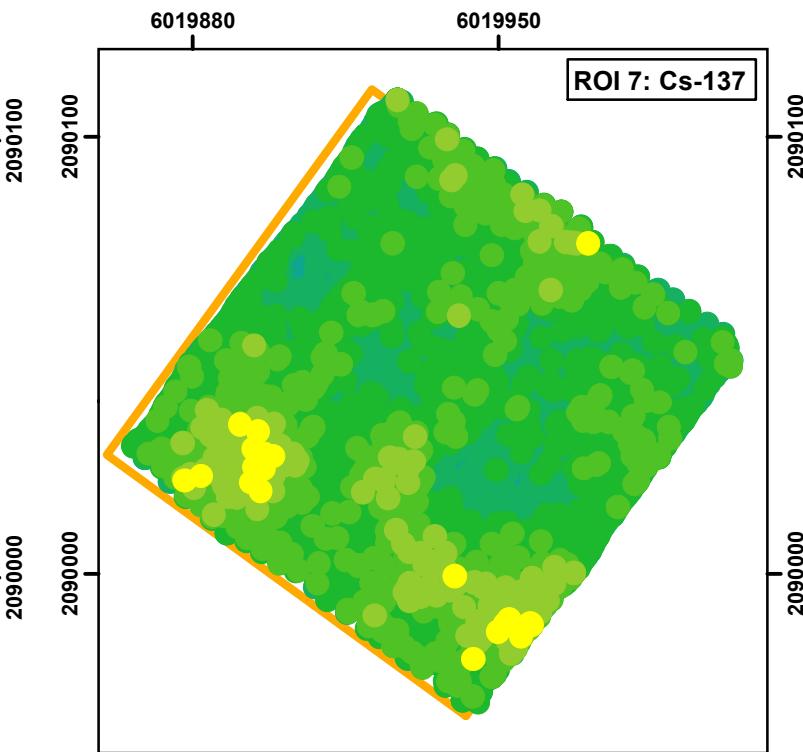
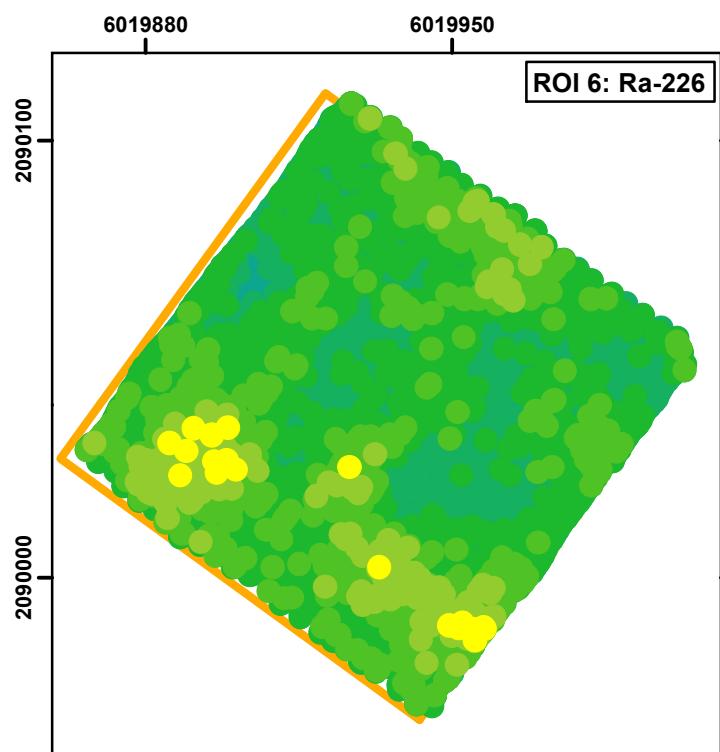
When count rates in the net gamma spectrum at a given location do not exceed critical levels for any radium-, cesium-, or cobalt-specific energy ranges, it is unlikely that ROC concentrations exist at that location above background.

Any data point that is both above the critical level and within the energy range of a given ROI is considered above background for that radionuclide and will be flagged for further investigation in the field.

Contour Map

HPNS Parcel E-2

RSY Pad D8 Deconstruction

**RS 700 Gamma Walkover Survey Data (VD1, ROI 10)**

- ◆ Follow-up Locations
- > -1 to < 0 std dev
- > 3 std dev
- > 2 to < 3 std dev
- > 1 to < 2 std dev
- > 0 to < 1 std dev
- > -2 to < -1 std dev
- > -3 to < -2 std dev
- < -3 std dev
- RSY Pad Boundaries

0 20 40 80
Feet

Coordinate system: CSP Zone III. NAD83, US Survey Foot



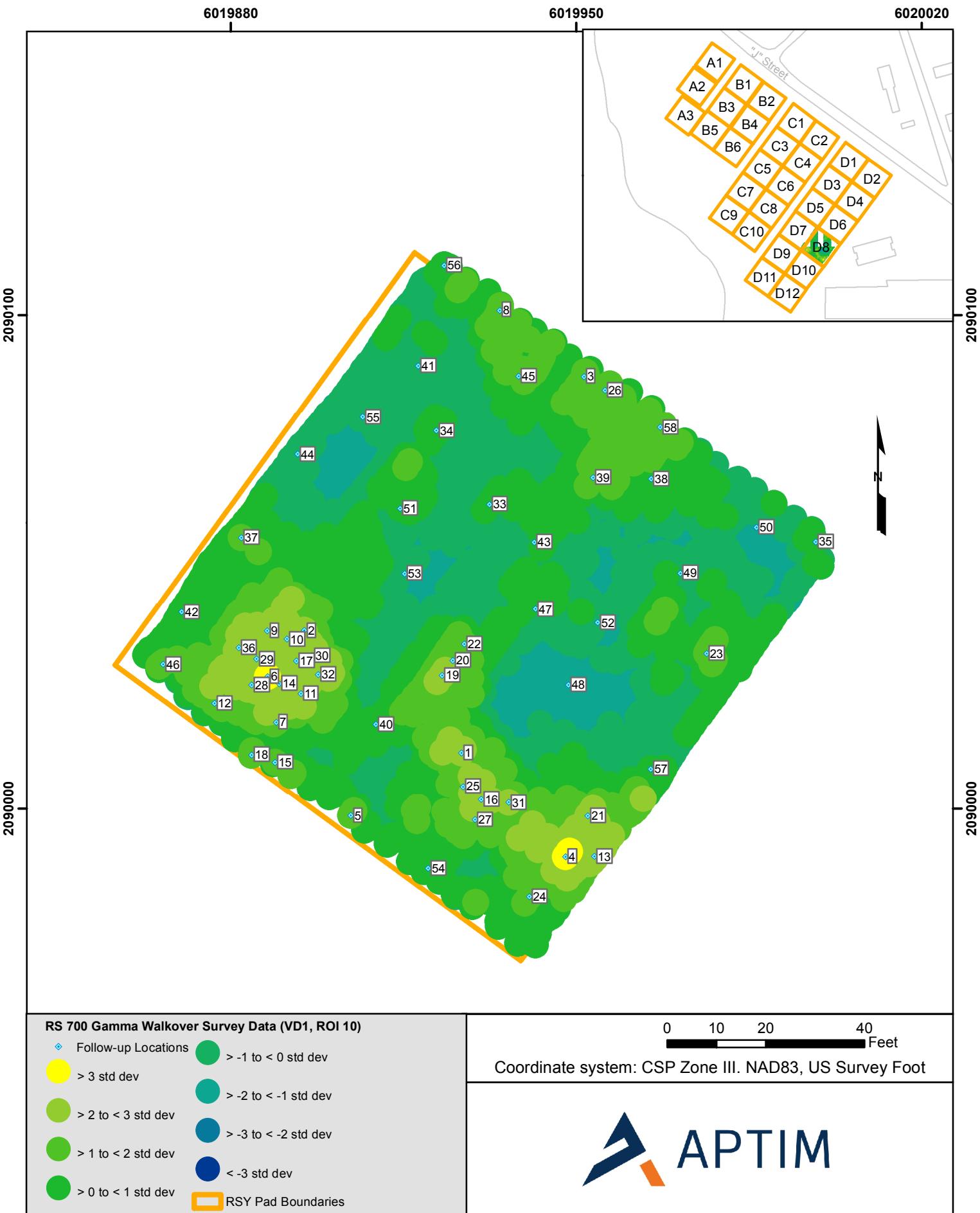
RSI Review Summary

Summary:

58 locations were initially selected for follow-up investigation. Locations were identified by elevated peaks noted in the playback review and/or time series charts, and by using the Z-Score, Local Z-Score, and Semi-Local Z-Score reviews as described in the RSI Data Evaluation Process on pages 3-4. Spectral analyses performed on 11 gamma static data locations exceeded the Reference Area Static IL for region of interest (ROIs) 6, 7, and/or 8. All other gamma static readings at follow-up locations were less than the Reference Area static IL for ROIs 3, 6, 7, and 8; figures for all locations are provided on pages 10-67.

RSI Follow-up Static Survey
HPRS-08212018-PE2-JSS2-2932

HPNS Parcel E-2 RSY Pad D8 (DC)



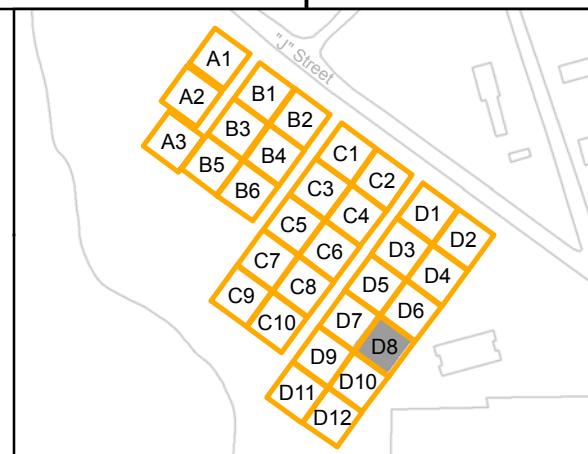
Systematic Sample Survey
HPRS-08102018-PE2-JSS-2915

HPNS Parcel E-2 RSY Pad D8-DC

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6019950

6020020

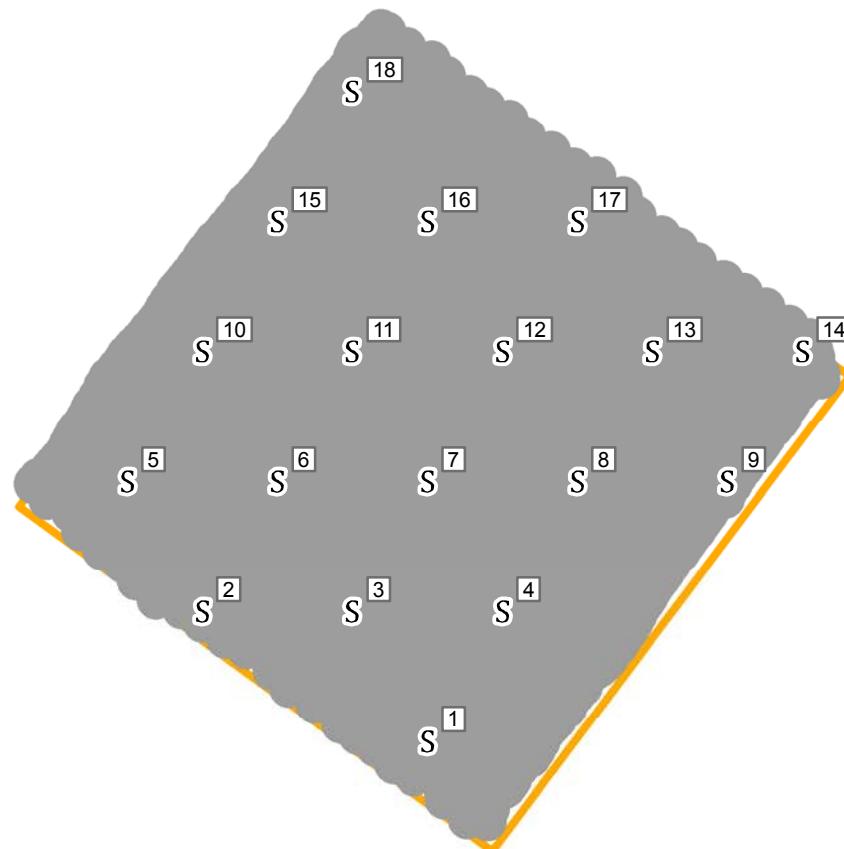


2090100

2090000

2090100

2090000



Survey Instrument: Model 2221/ 44-20
Serial Number: 117634

S Systematic Sample Locations

RS-700 GWS Scan Coverage

RSY Pad Boundaries

0 15 30 60 Feet

Coordinate system: CSP Zone III, NAD83, US Survey Foot



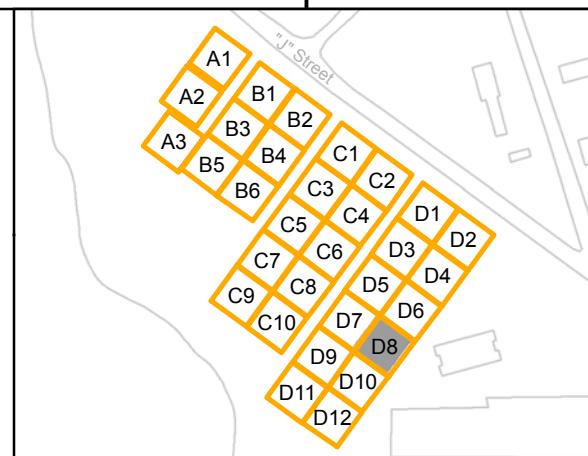
Biased Sample Survey
HPRS-08222018-PE2-JSS-2935

**HPNS Parcel E-2
RSY Pad D8-DC**

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6019950

6020020

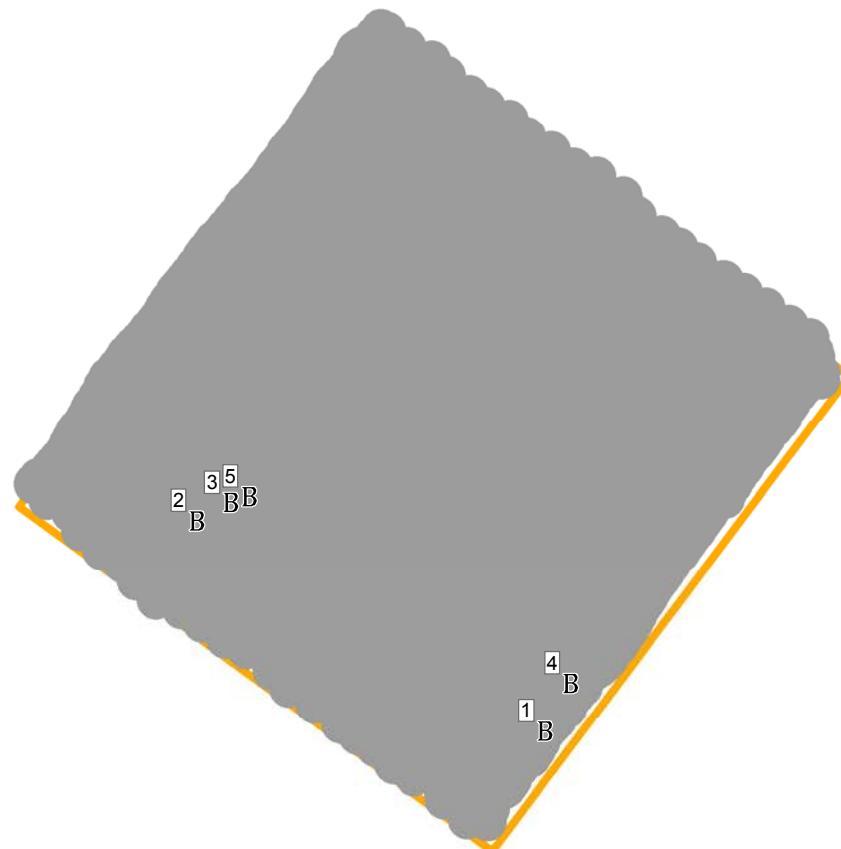


2090100

2090000

2090100

2090000



0 15 30 60 Feet

Coordinate system: CSP Zone III, NAD83, US Survey Foot

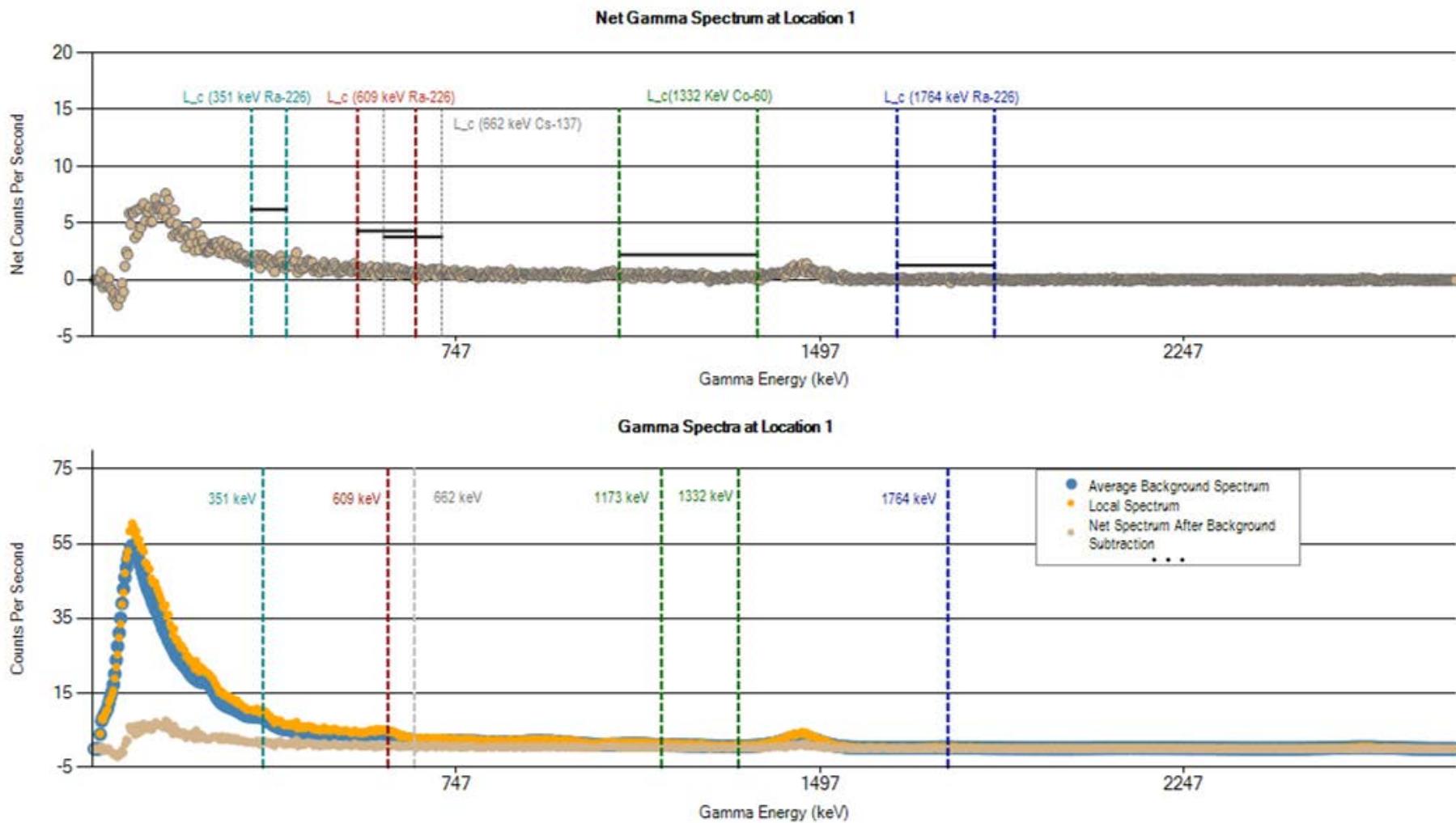
**Survey Instrument: Model 2221/ 44-20
Serial Number: 117634**

B Biased Sample Locations

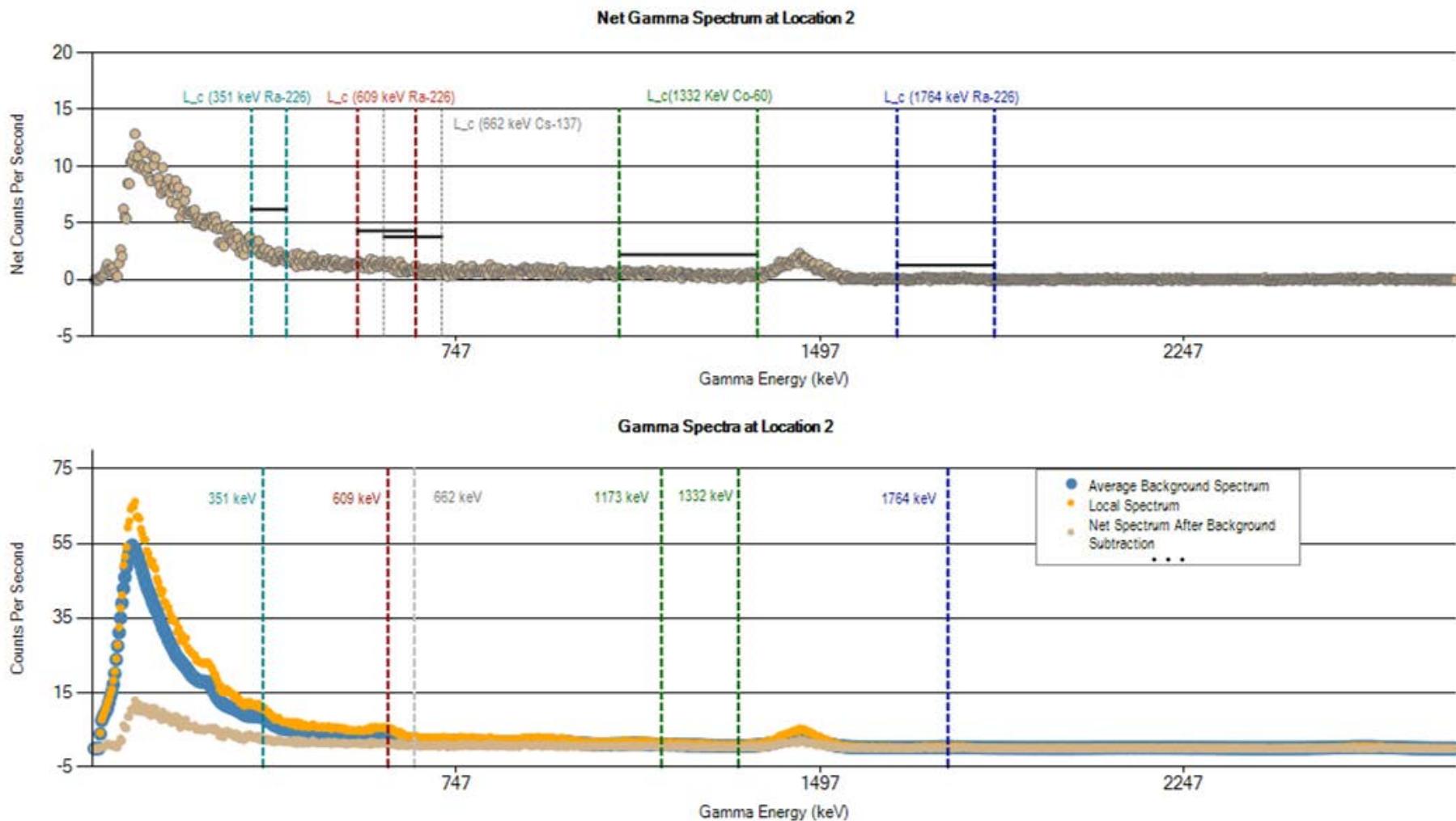
RS-700 GWS Scan Coverage

RSY Pad Boundaries

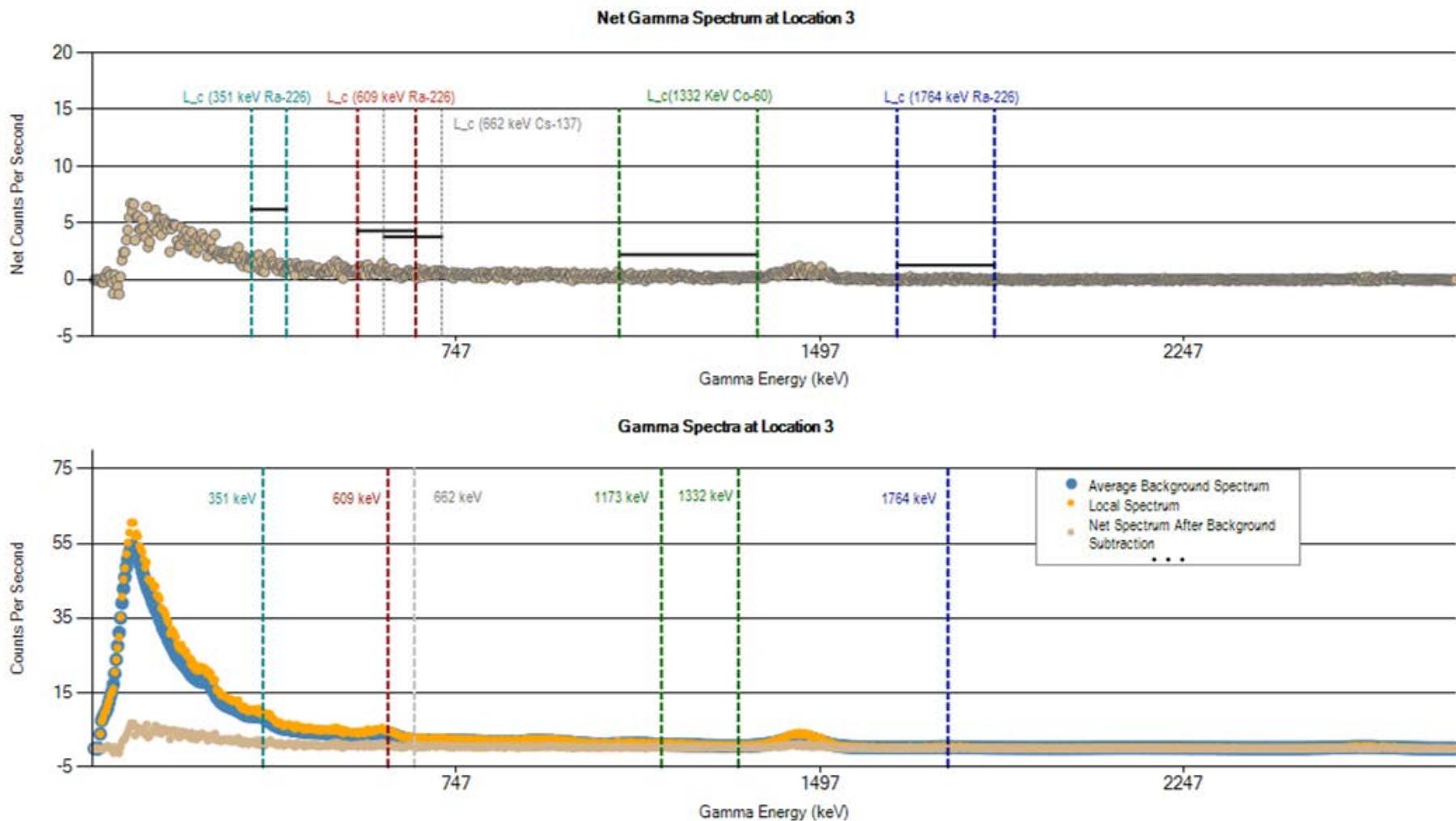




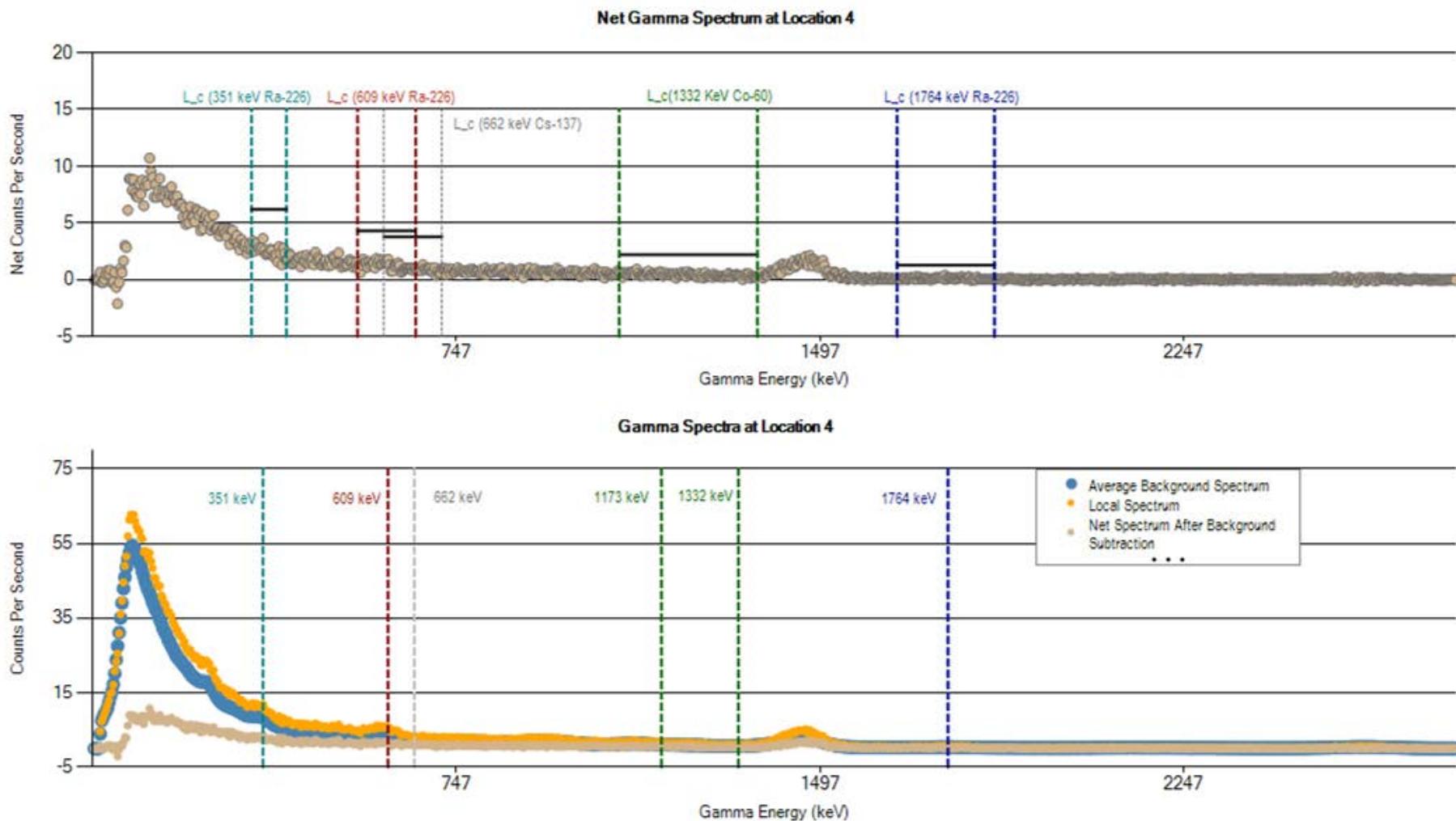
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Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



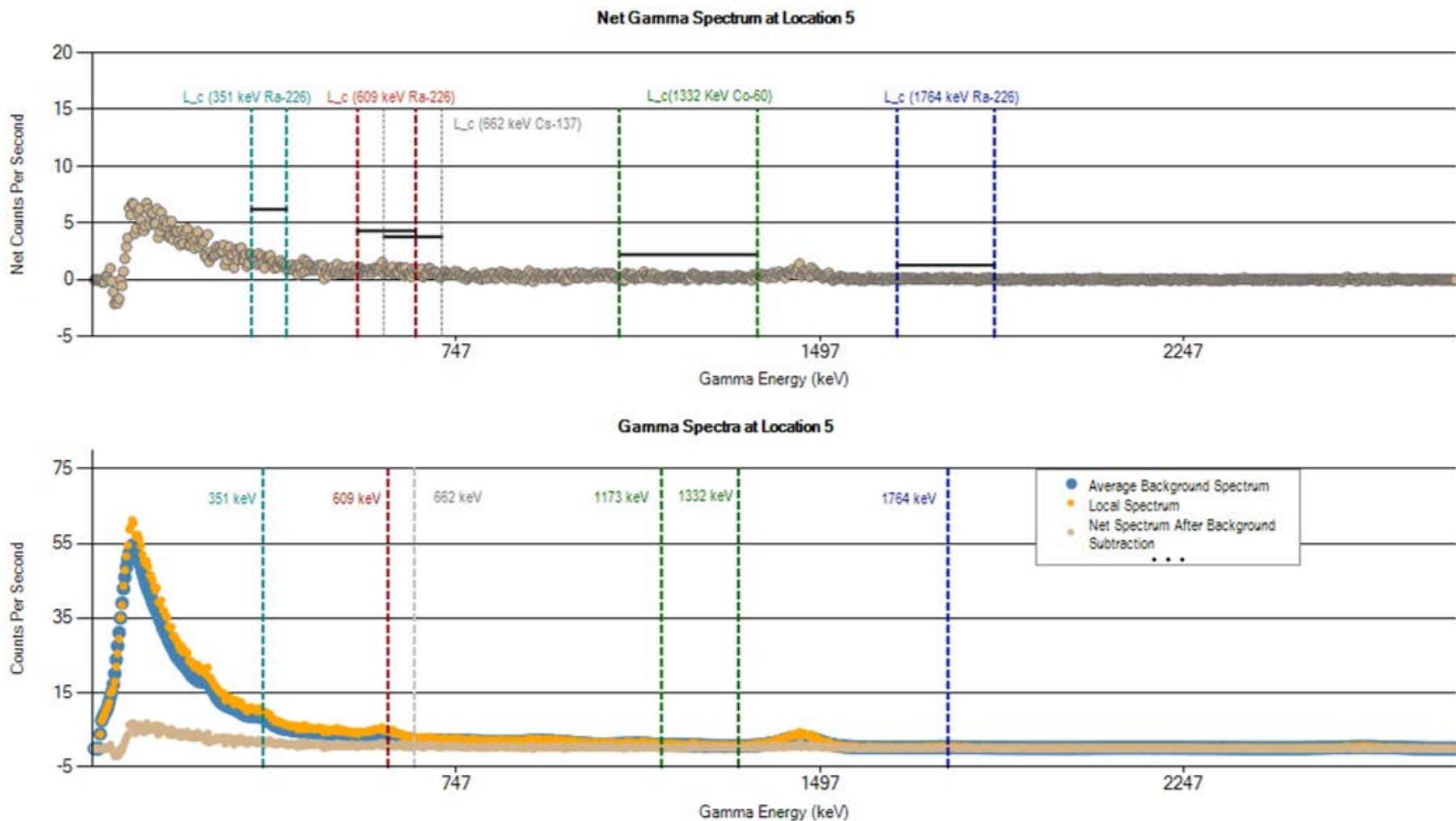
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Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



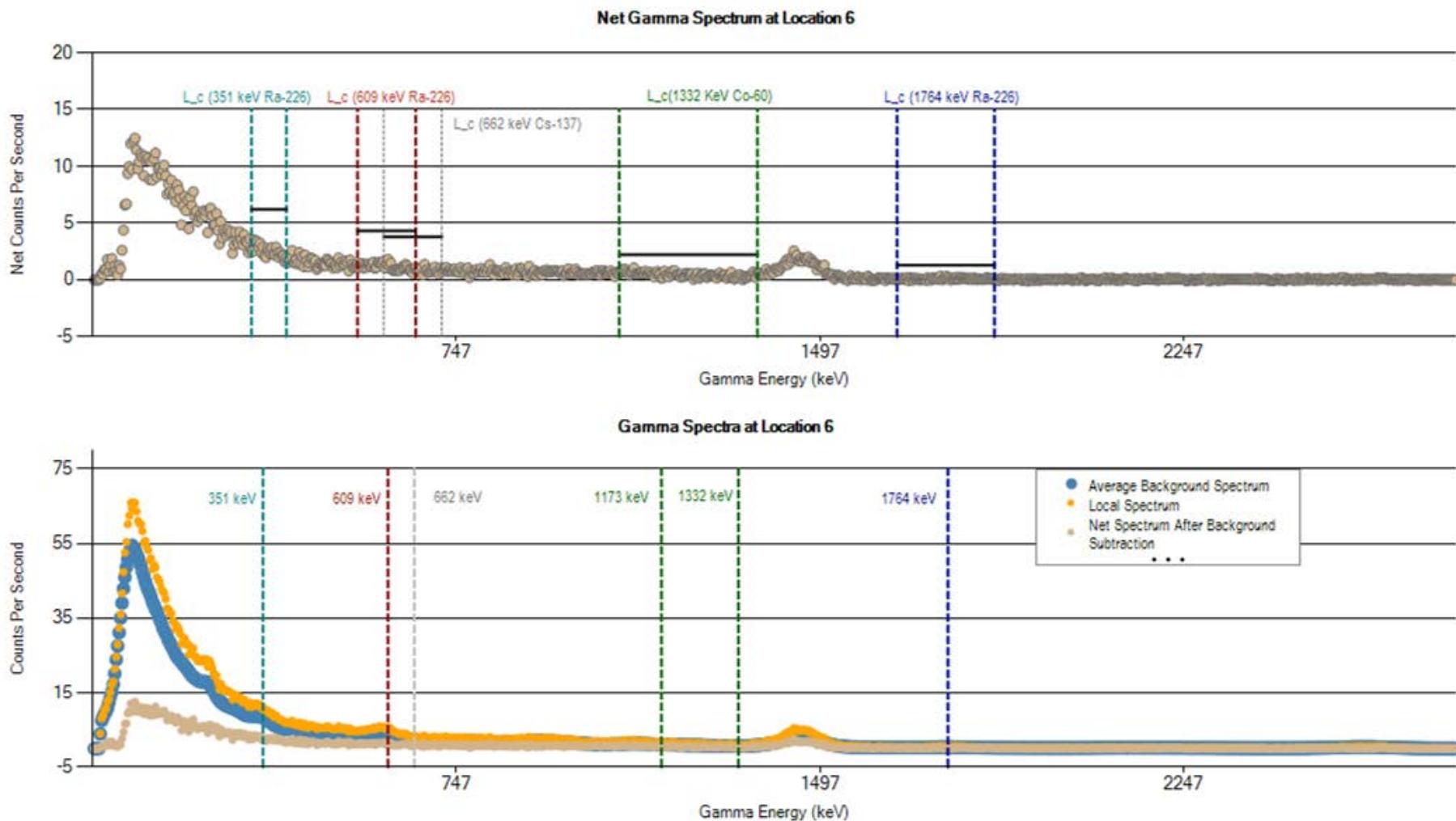
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 3 (cps)	1052	148	24	28	184	169	132	208	112	4161
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



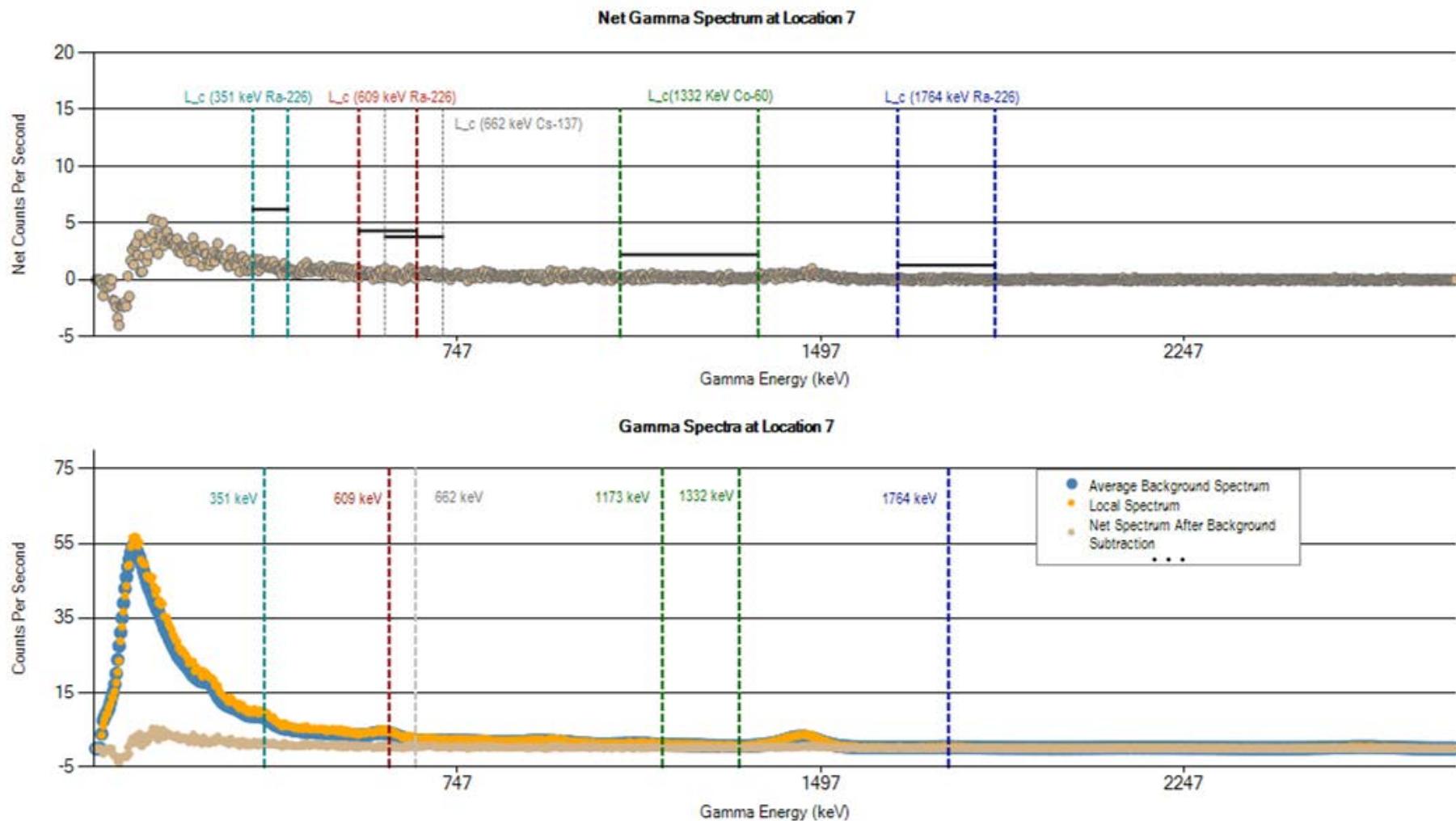
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Location 4 (cps)	1200	175	29	29	211	192	149	237	130	4547
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



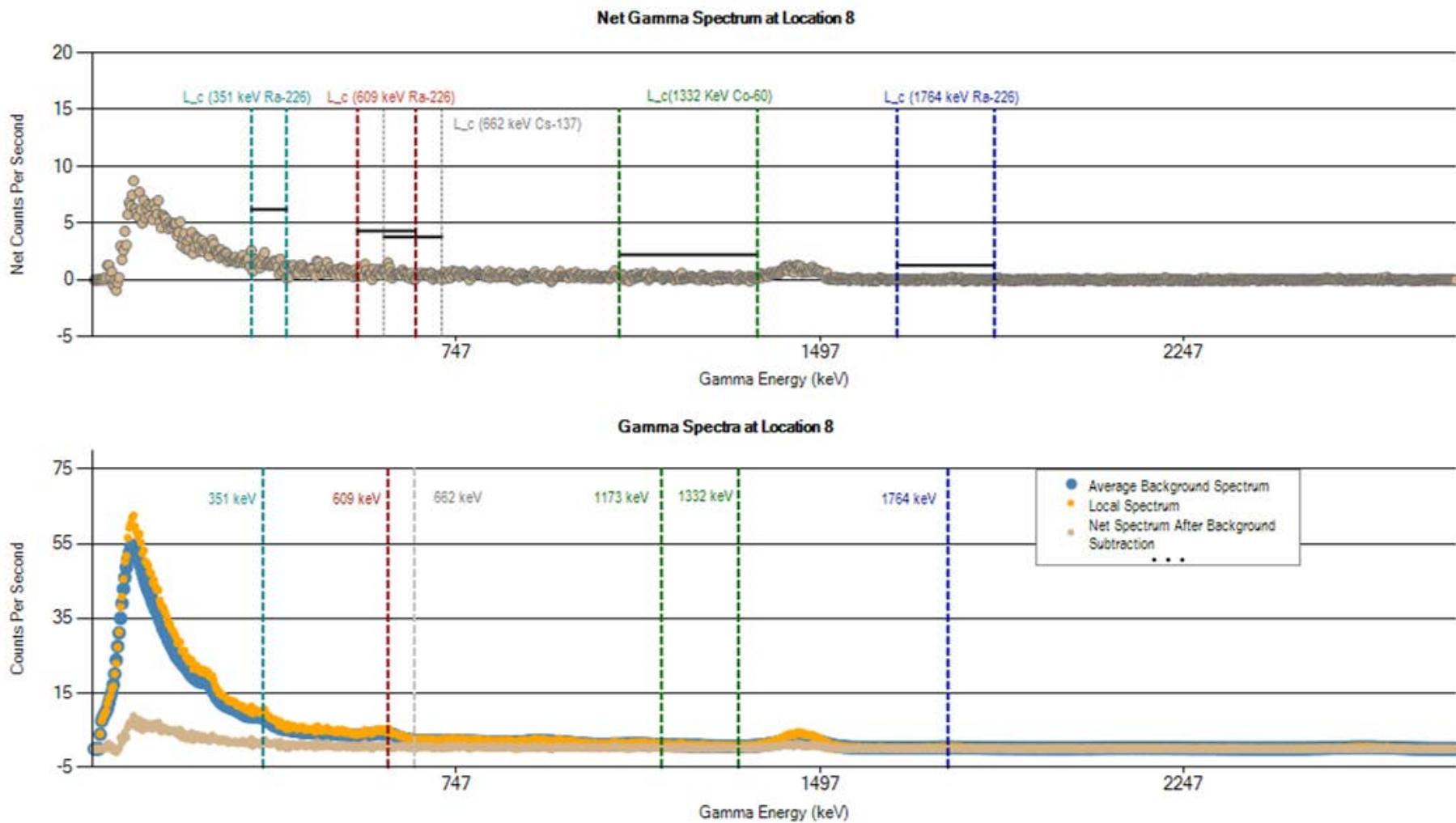
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 5 (cps)	1046	143	26	27	183	173	135	213	112	4158
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



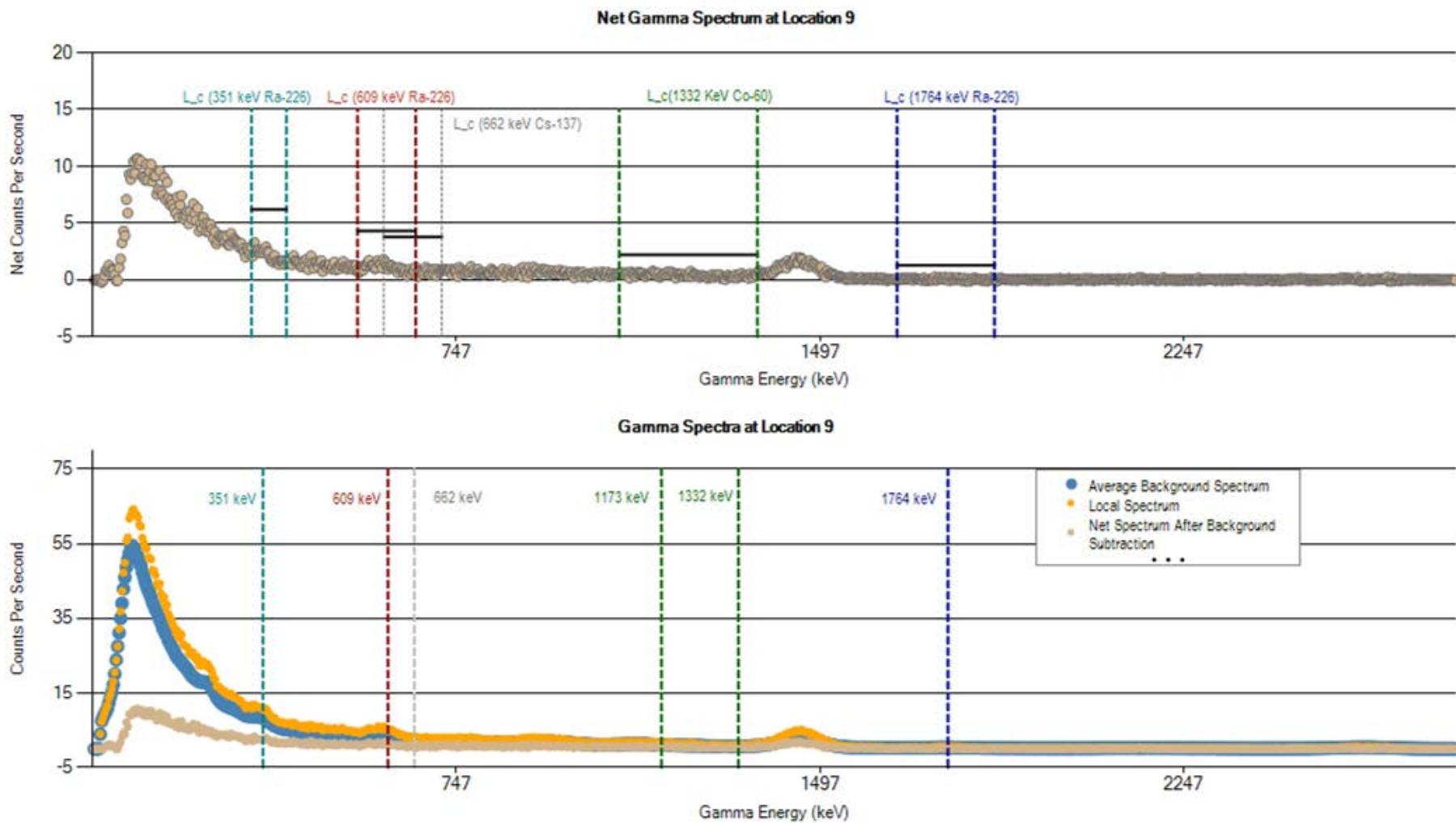
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Location 6 (cps)	1196	180	27	28	204	188	147	237	132	4645
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



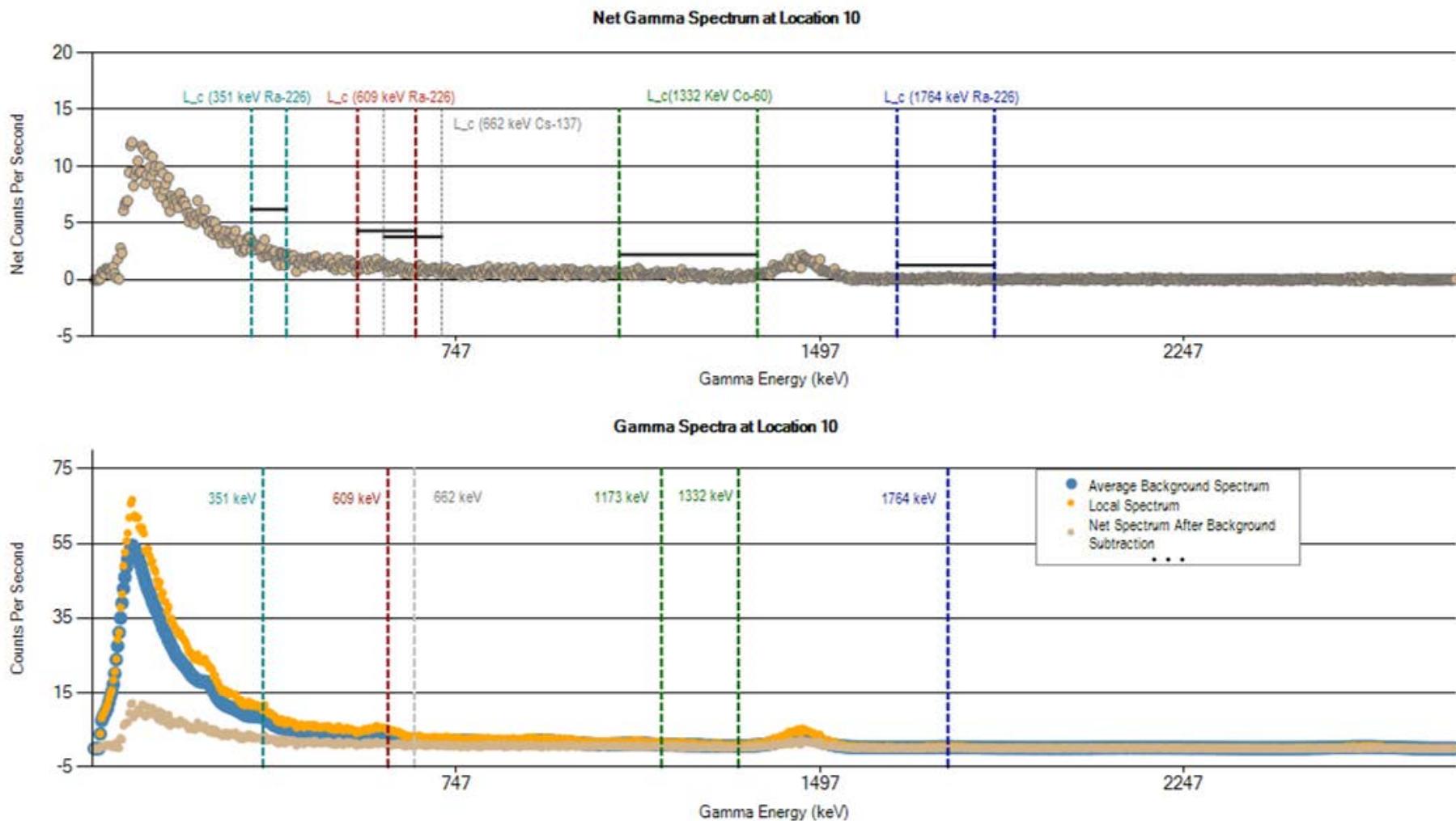
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Location 7 (cps)	1008	138	24	25	180	160	127	203	108	3977
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



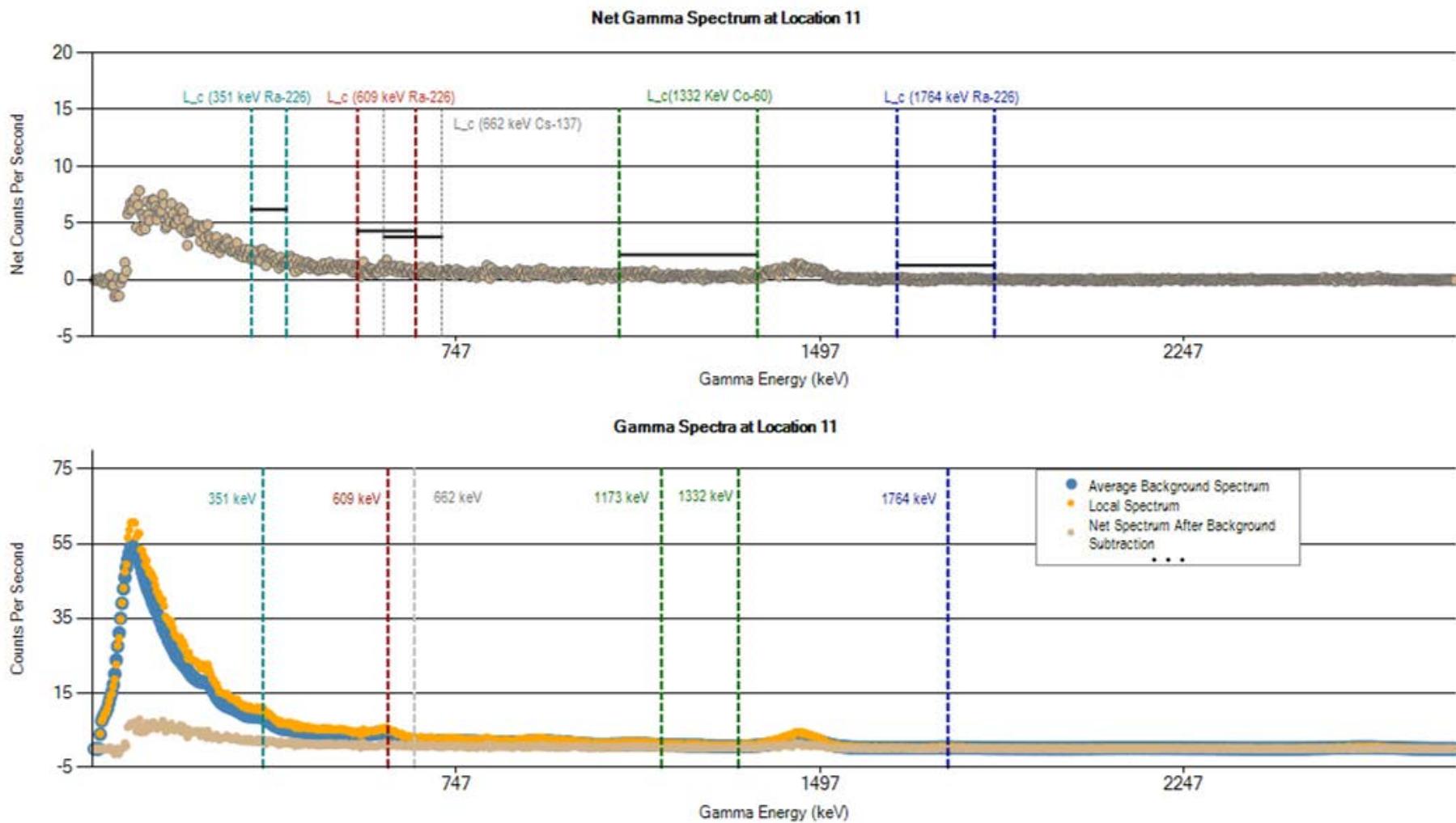
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Location 8 (cps)	1034	153	23	26	181	164	127	208	110	4182
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



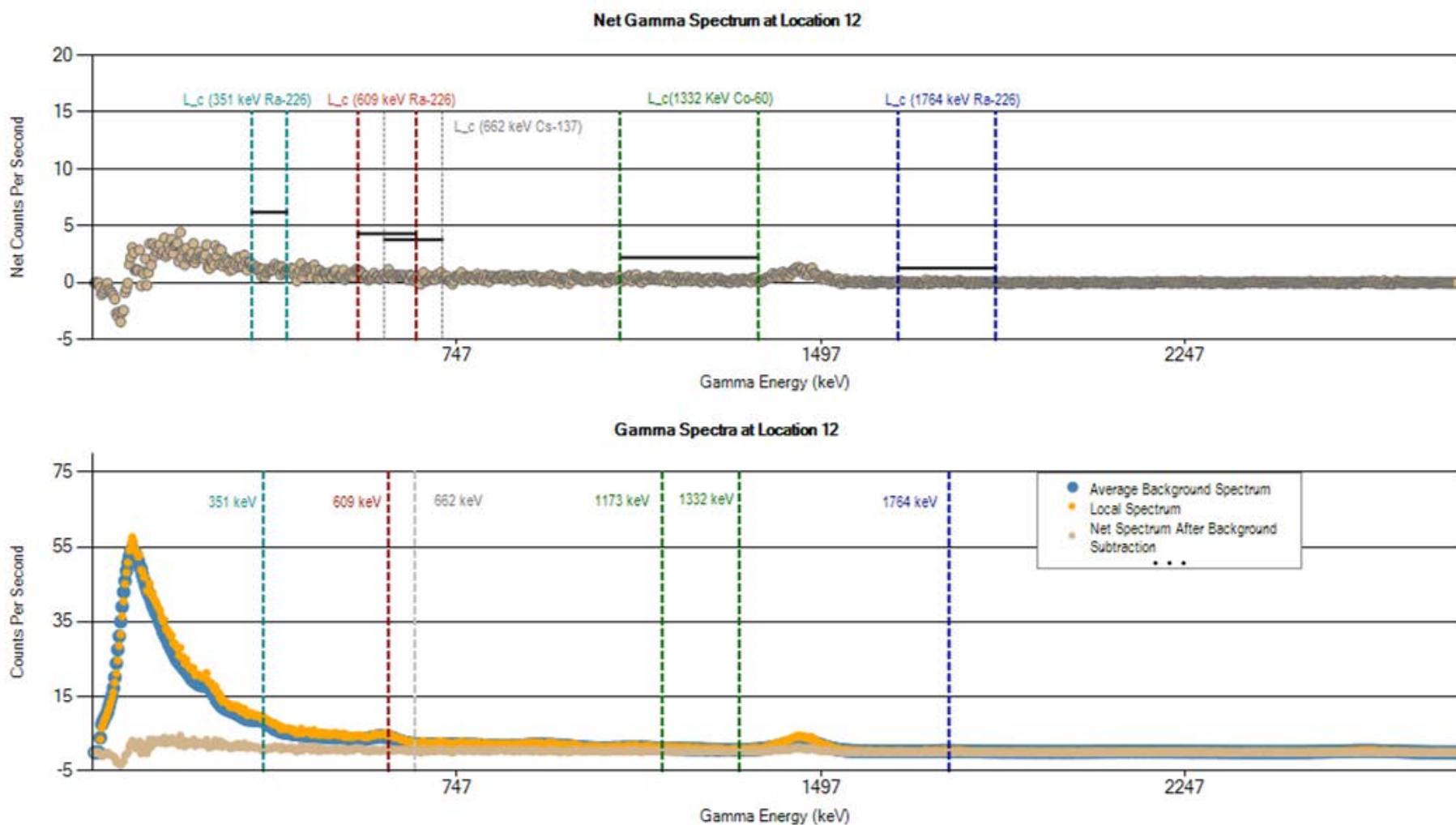
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Location 9 (cps)	1165	175	25	28	199	184	142	227	129	4525
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



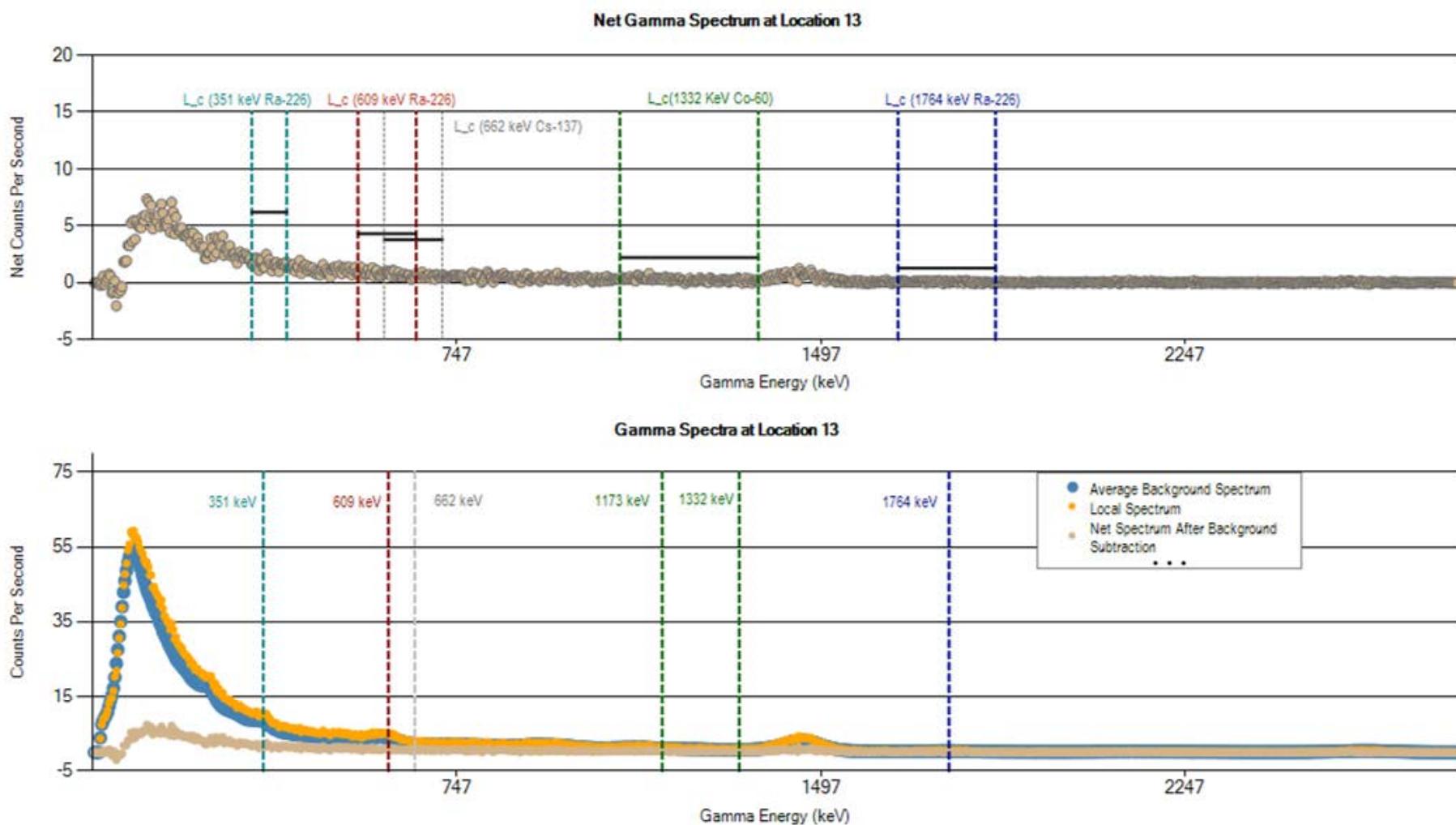
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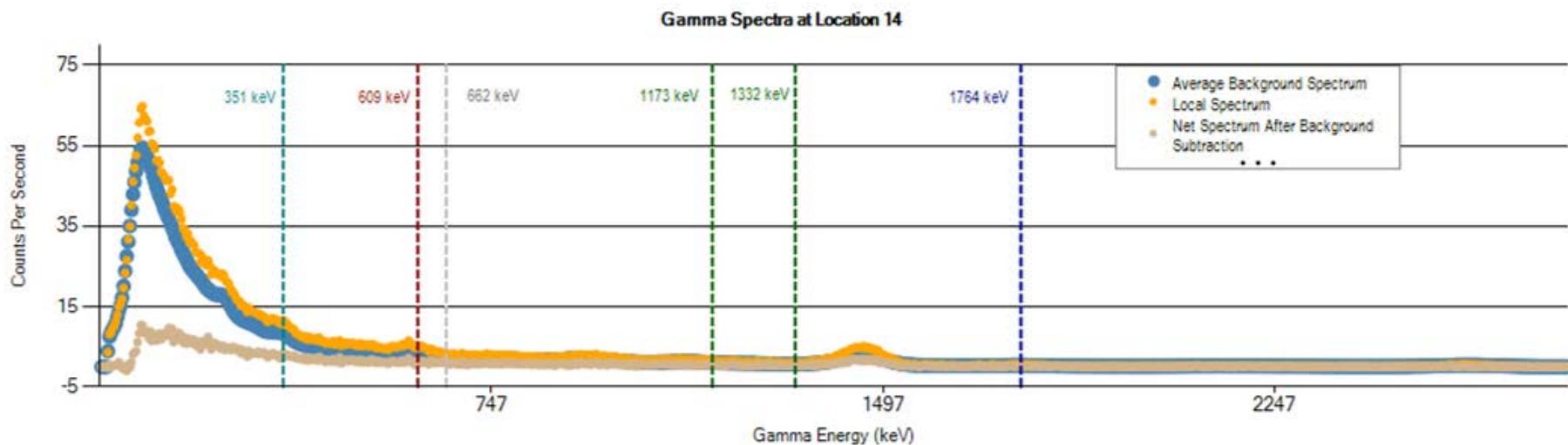
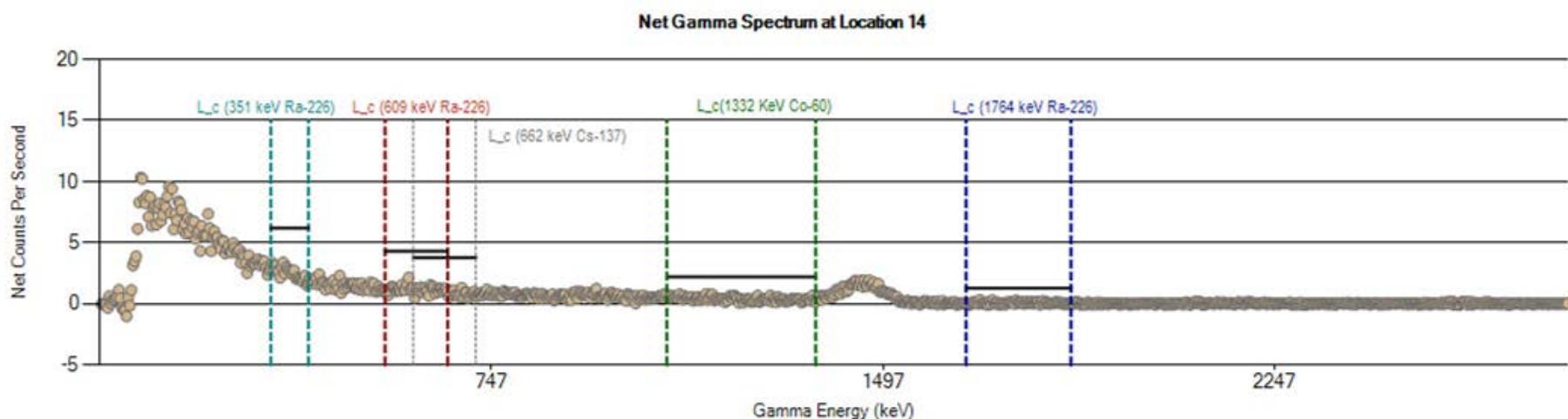
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 11 (cps)	1113	157	25	28	193	177	141	221	123	4309
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



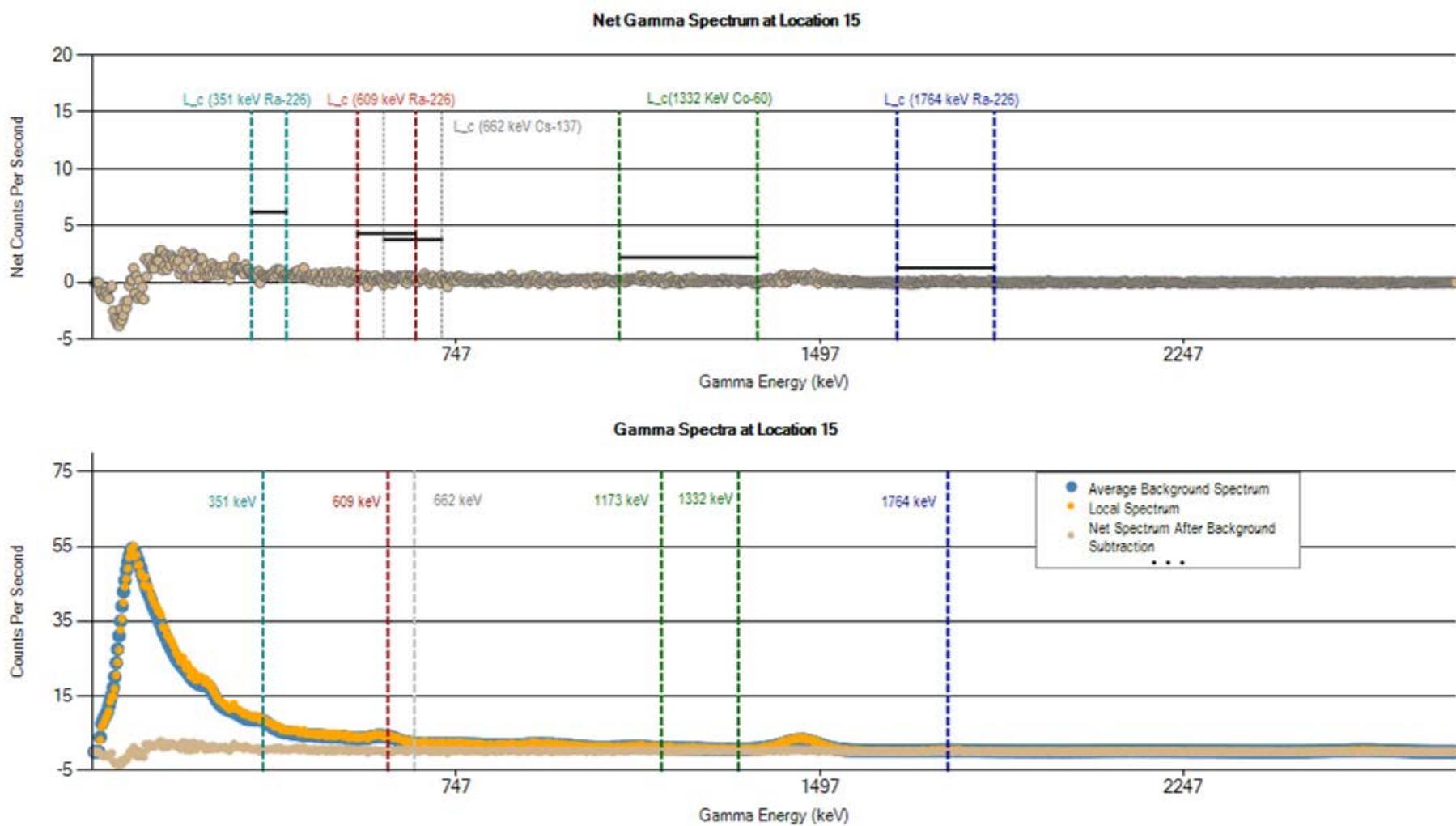
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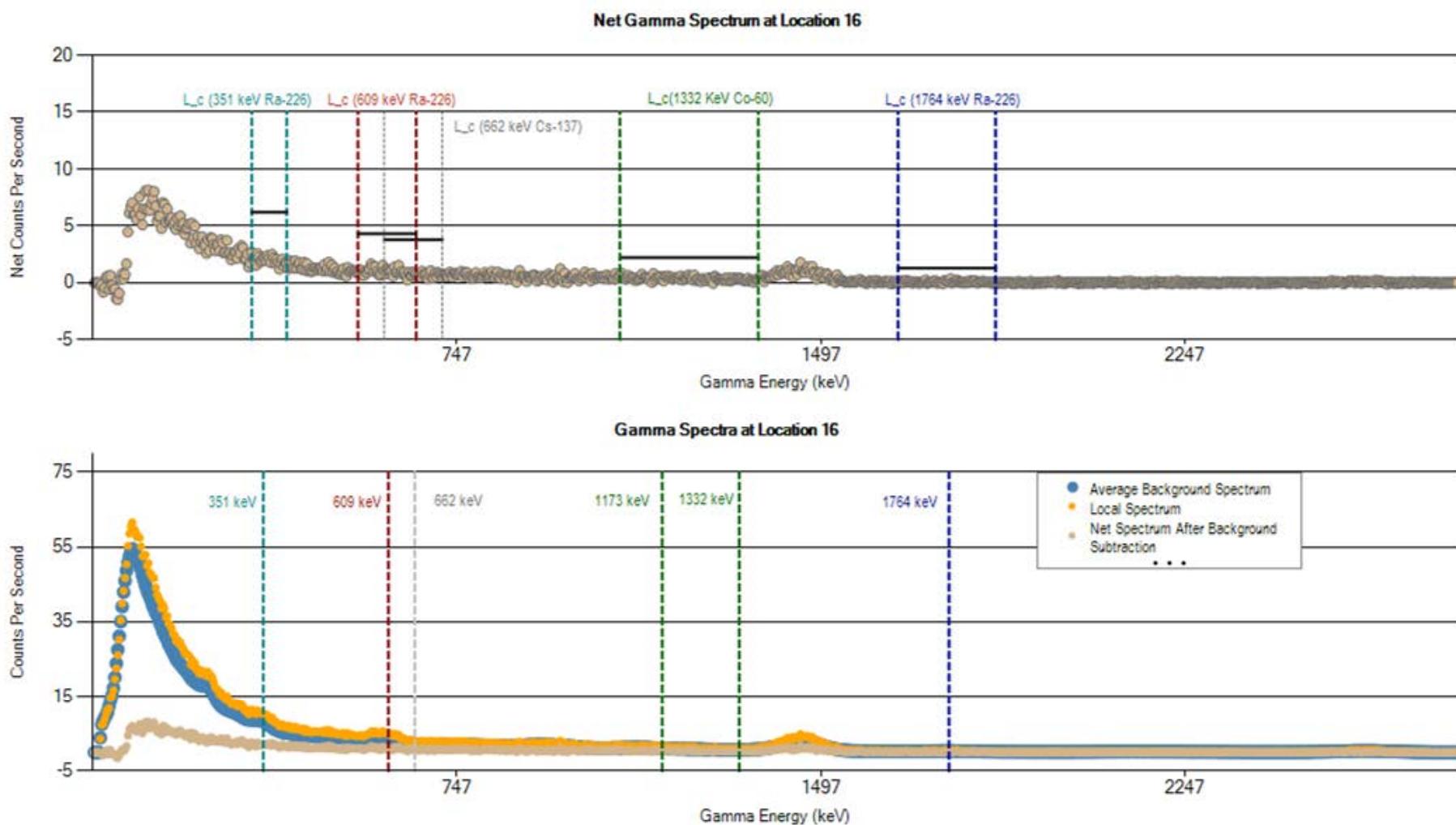
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 13 (cps)	1071	145	25	27	191	172	134	216	114	4222
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



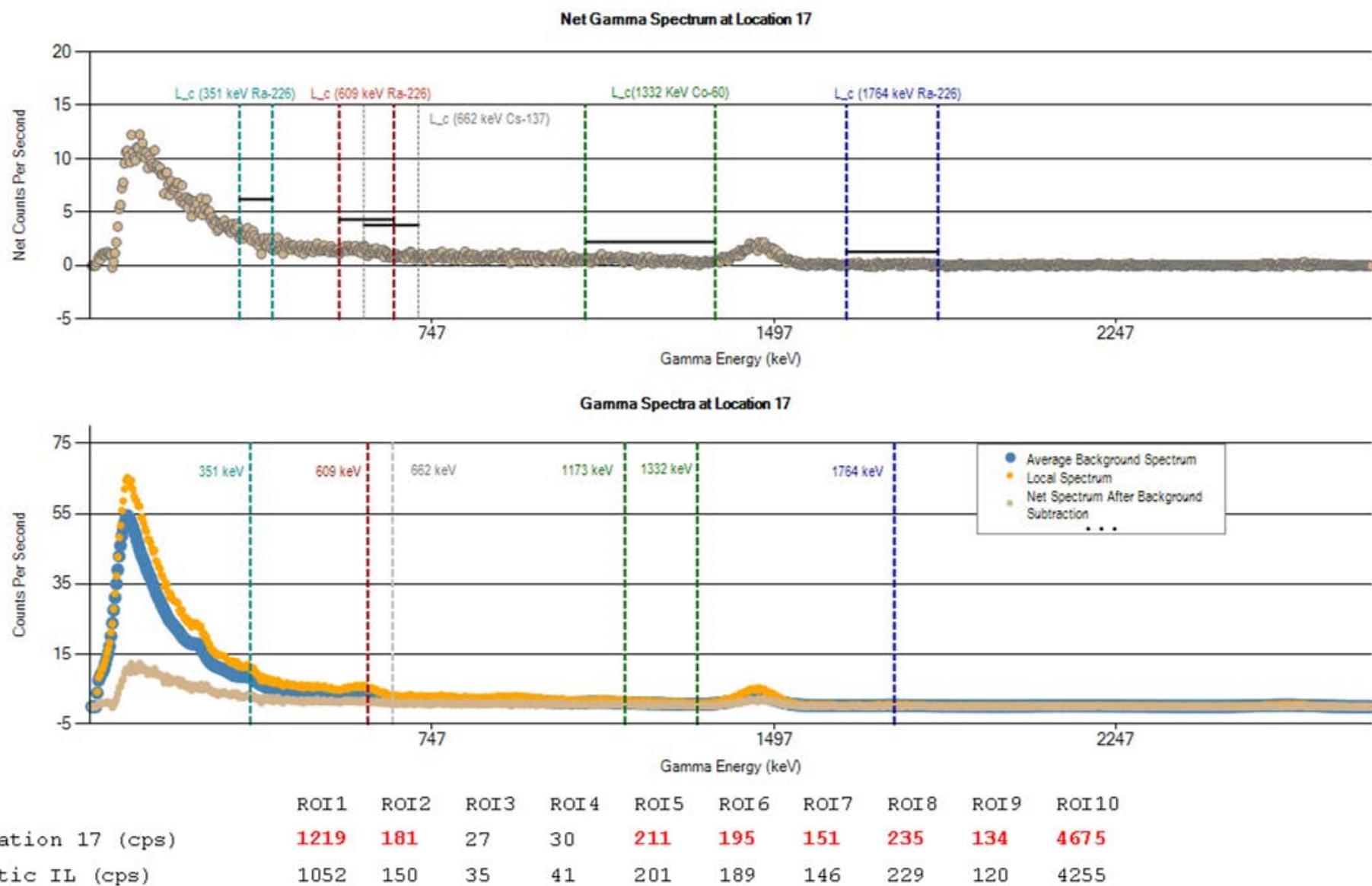
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Location 14 (cps)	1187	176	26	29	204	189	147	237	128	4522
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255

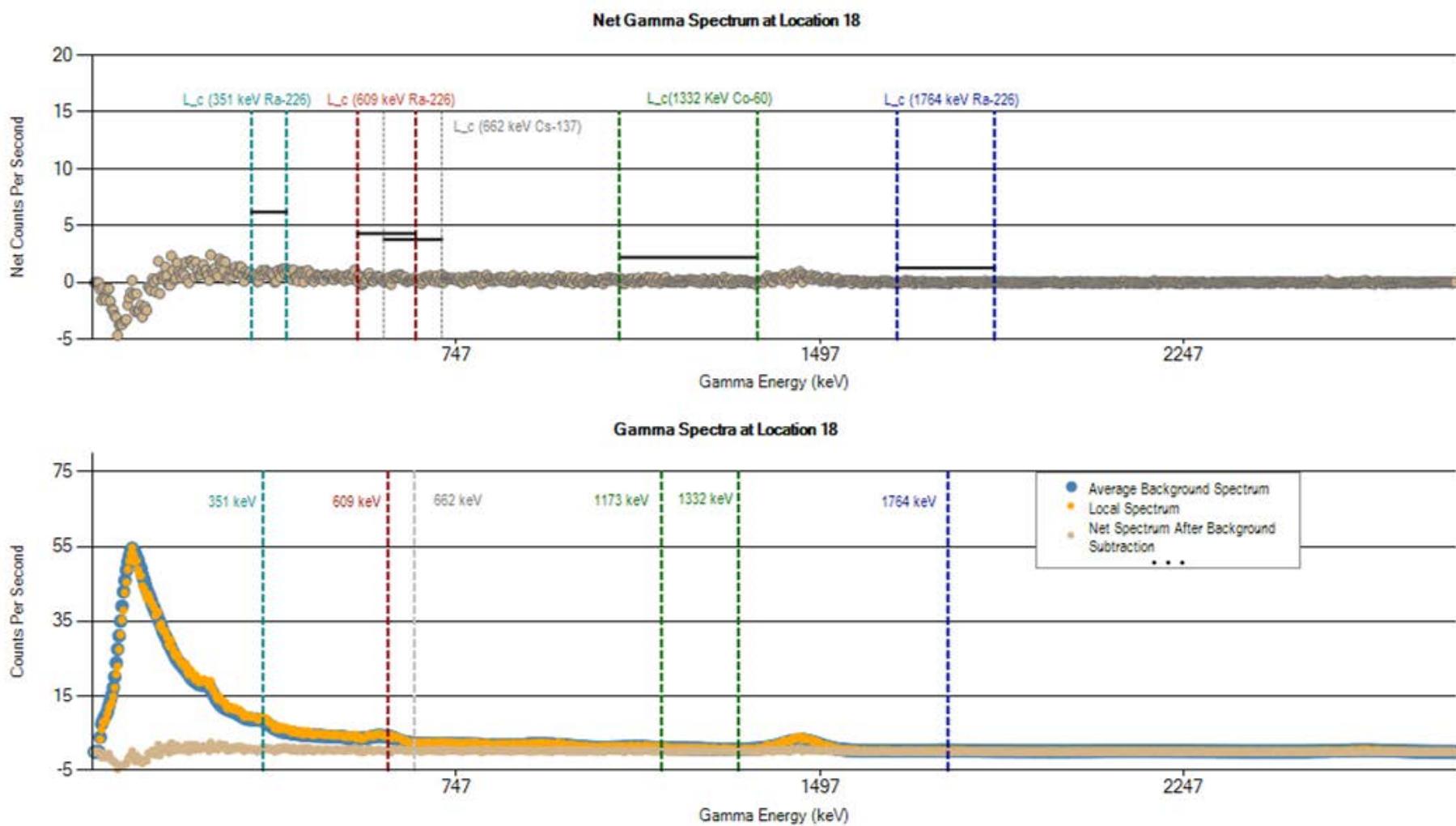


	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 15 (cps)	963	133	24	24	168	154	121	191	106	3804
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255

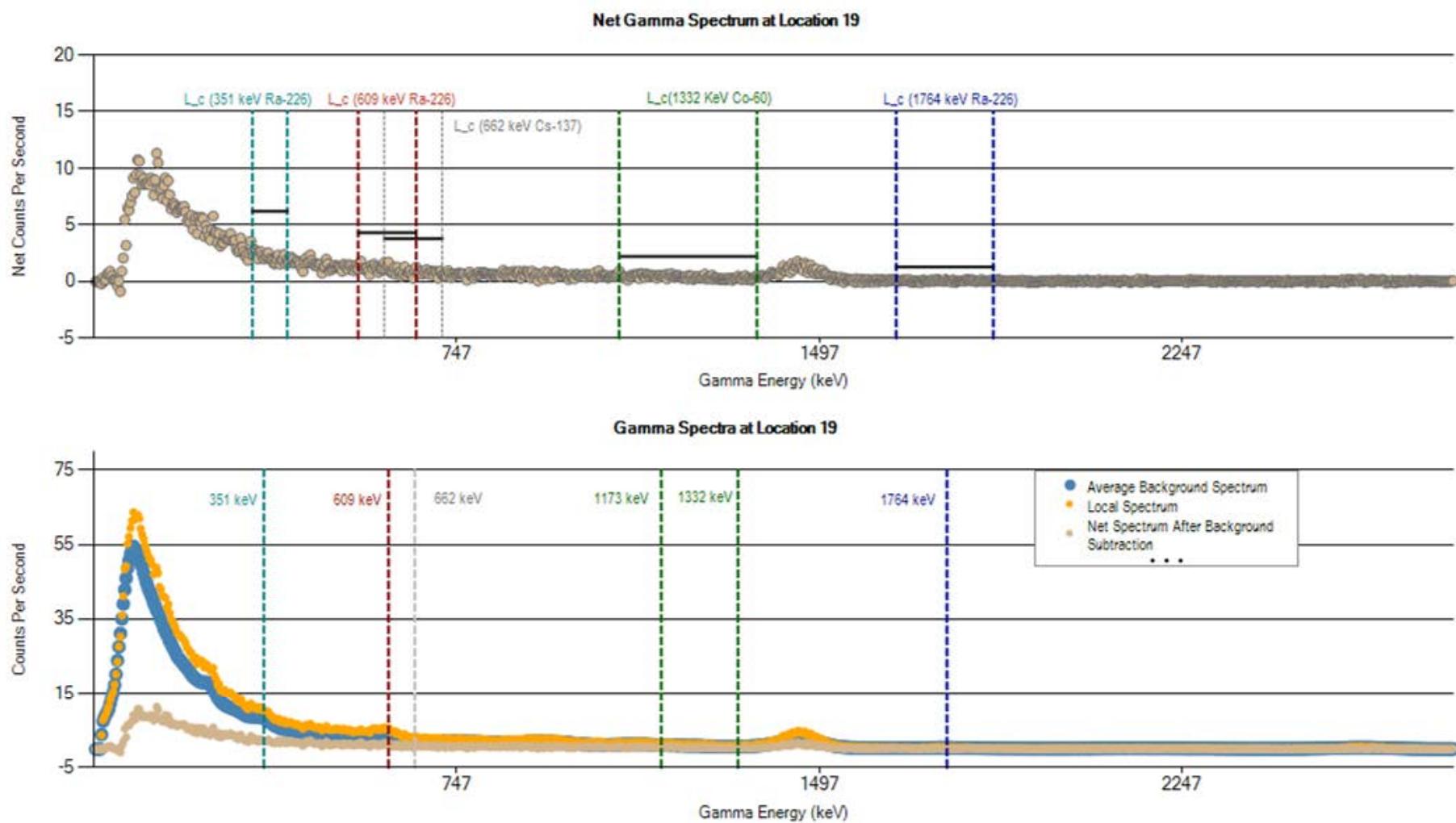


	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 16 (cps)	1119	159	25	28	194	179	140	223	123	4320
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255

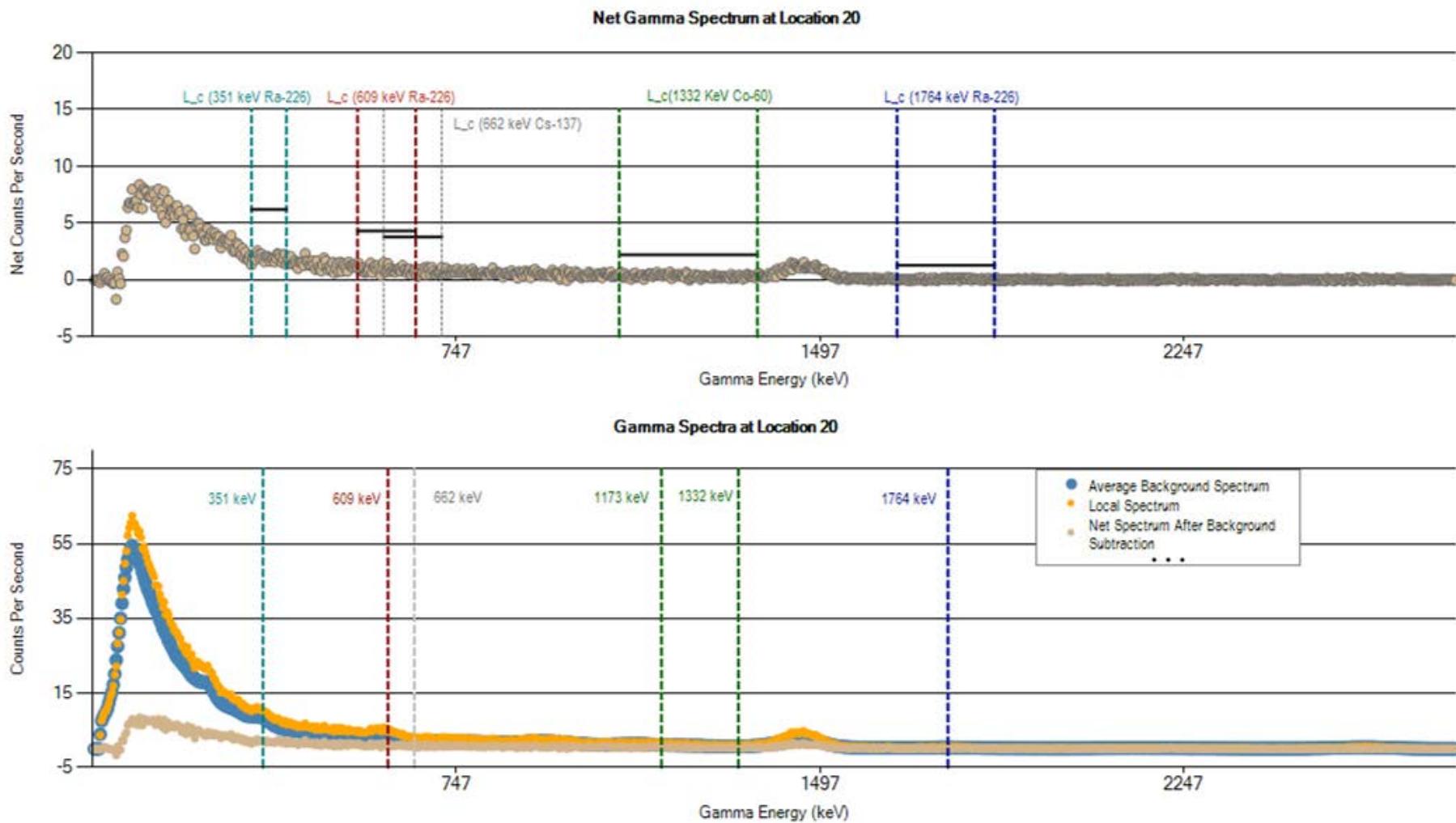




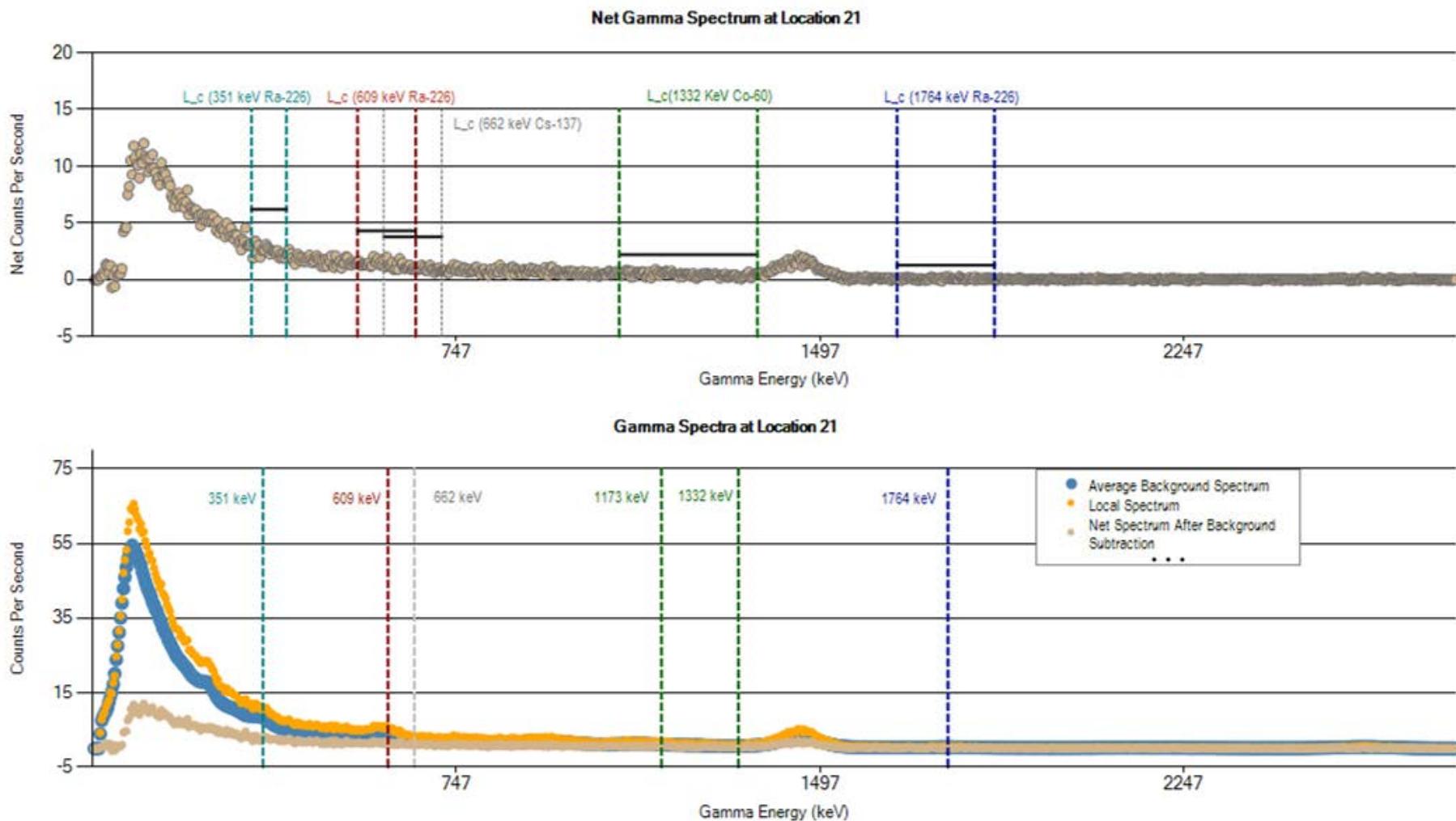
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 18 (cps)	965	136	22	25	169	154	121	192	102	3731
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



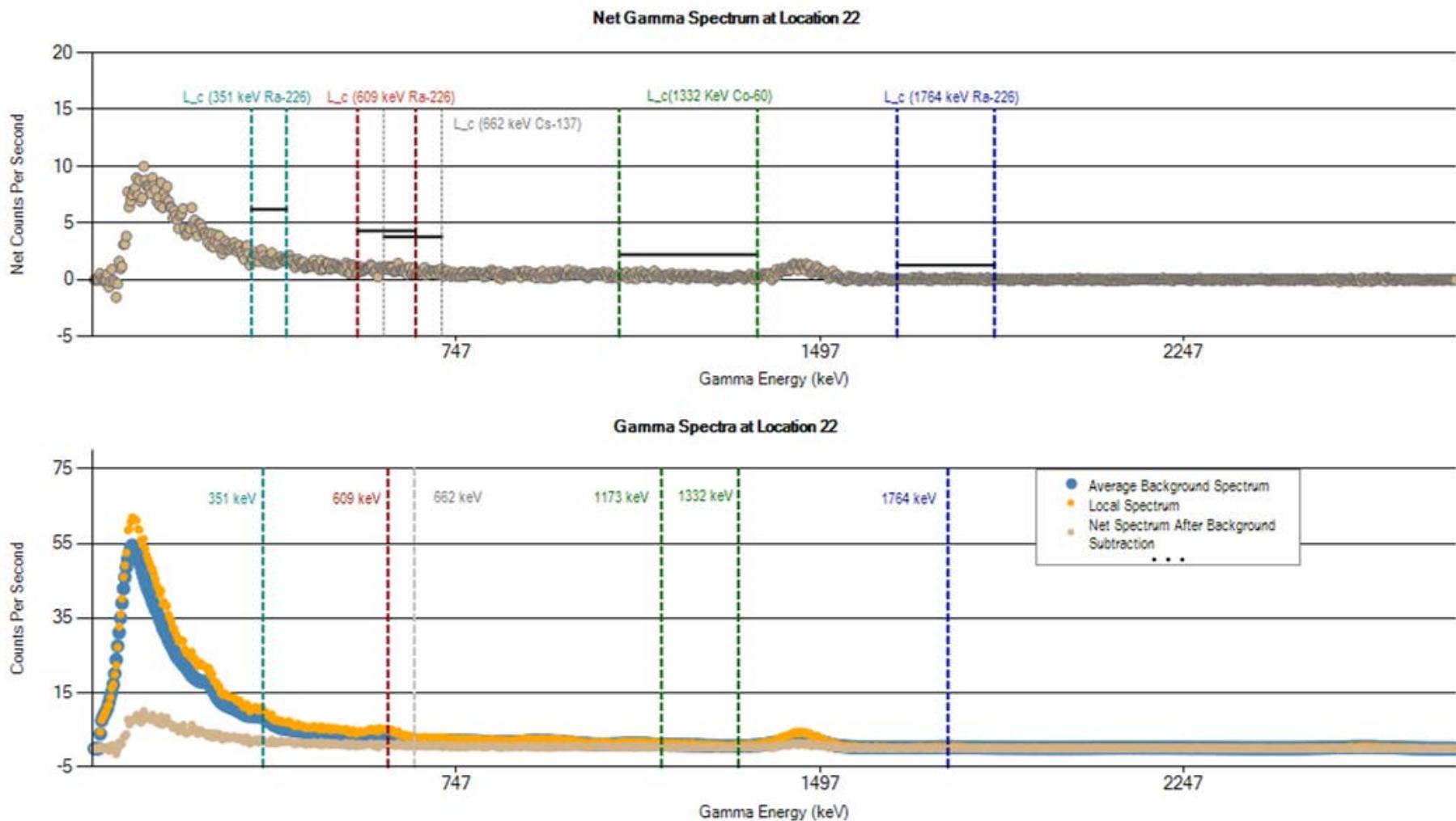
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 19 (cps)	1148	163	24	28	201	183	142	227	126	4493
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



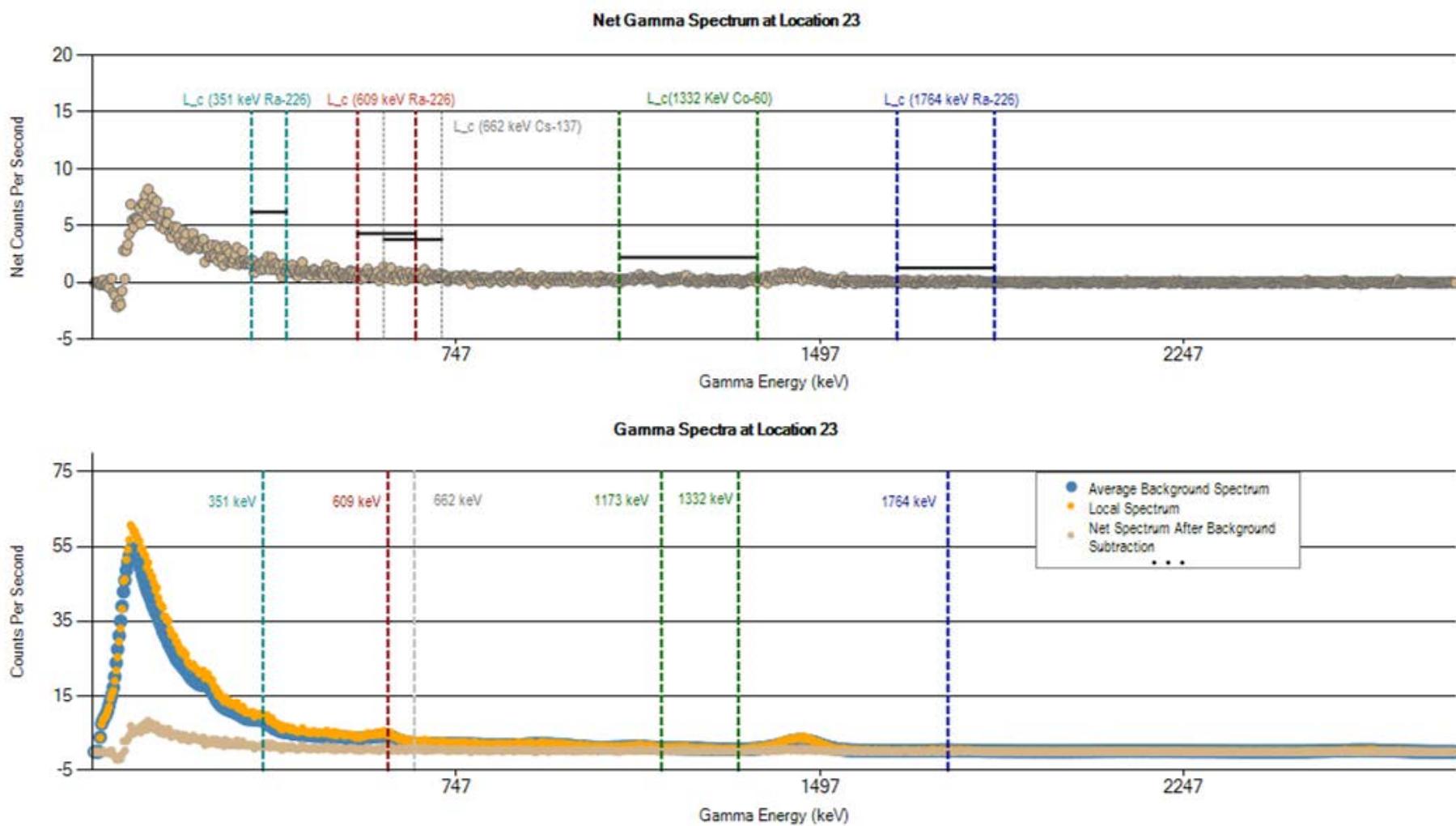
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 20 (cps)	1124	161	25	27	196	178	140	223	122	4375
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



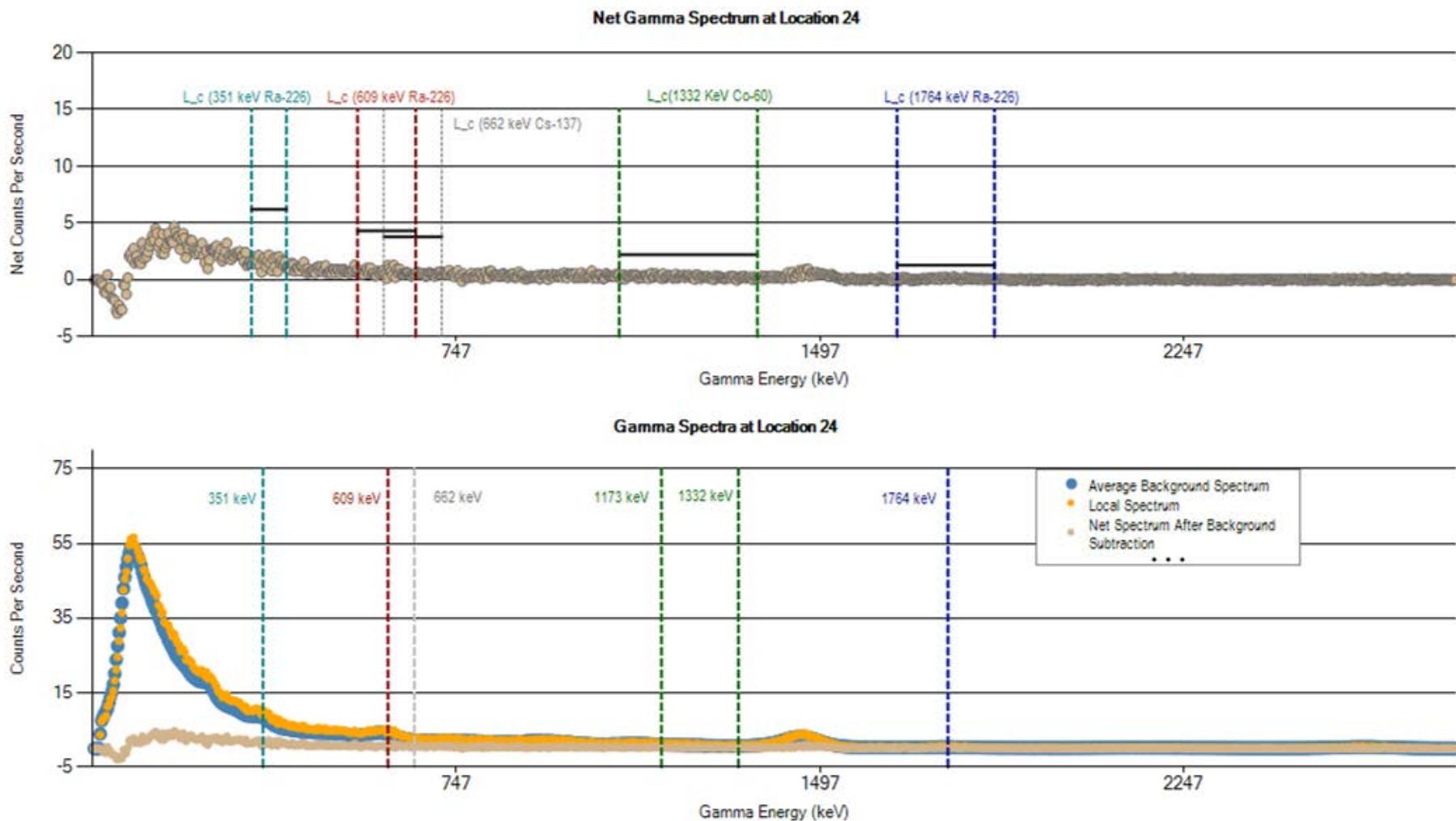
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 21 (cps)	1217	176	27	30	211	195	152	237	133	4645
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



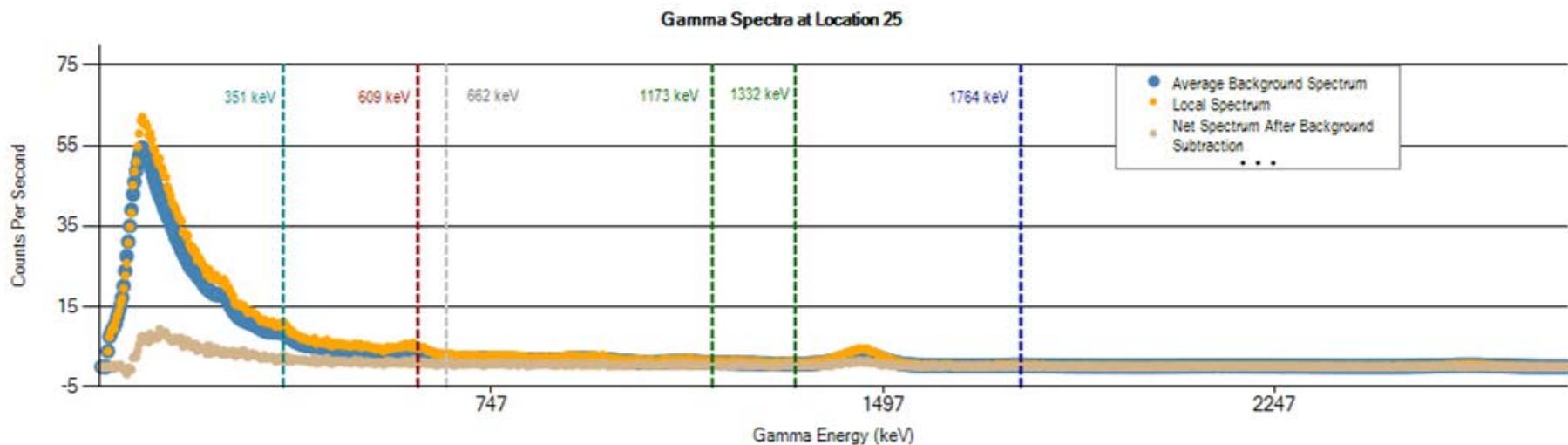
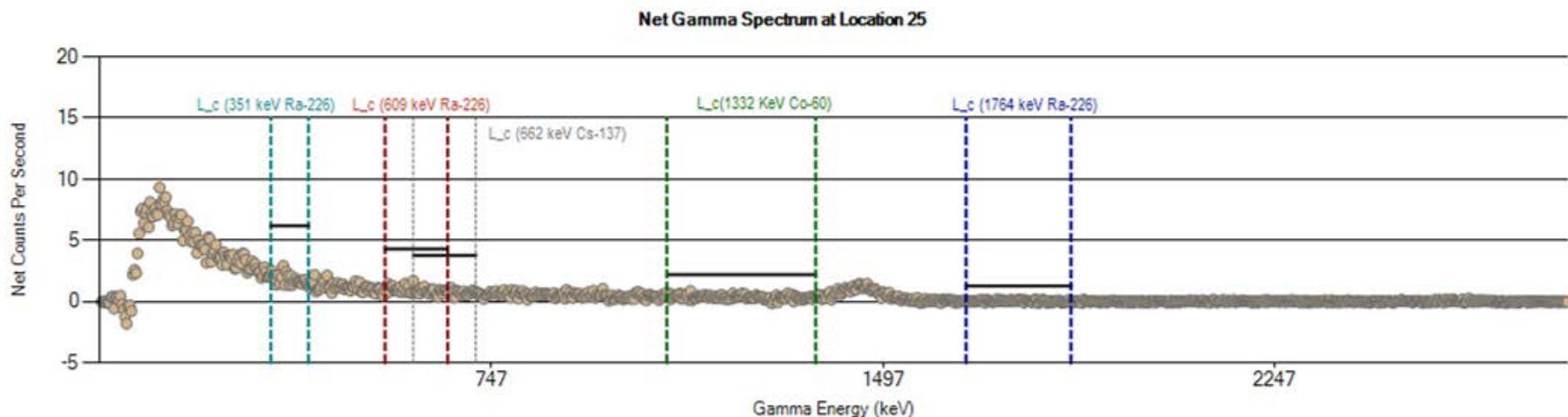
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 22 (cps)	1097	157	25	26	194	178	140	220	118	4363
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



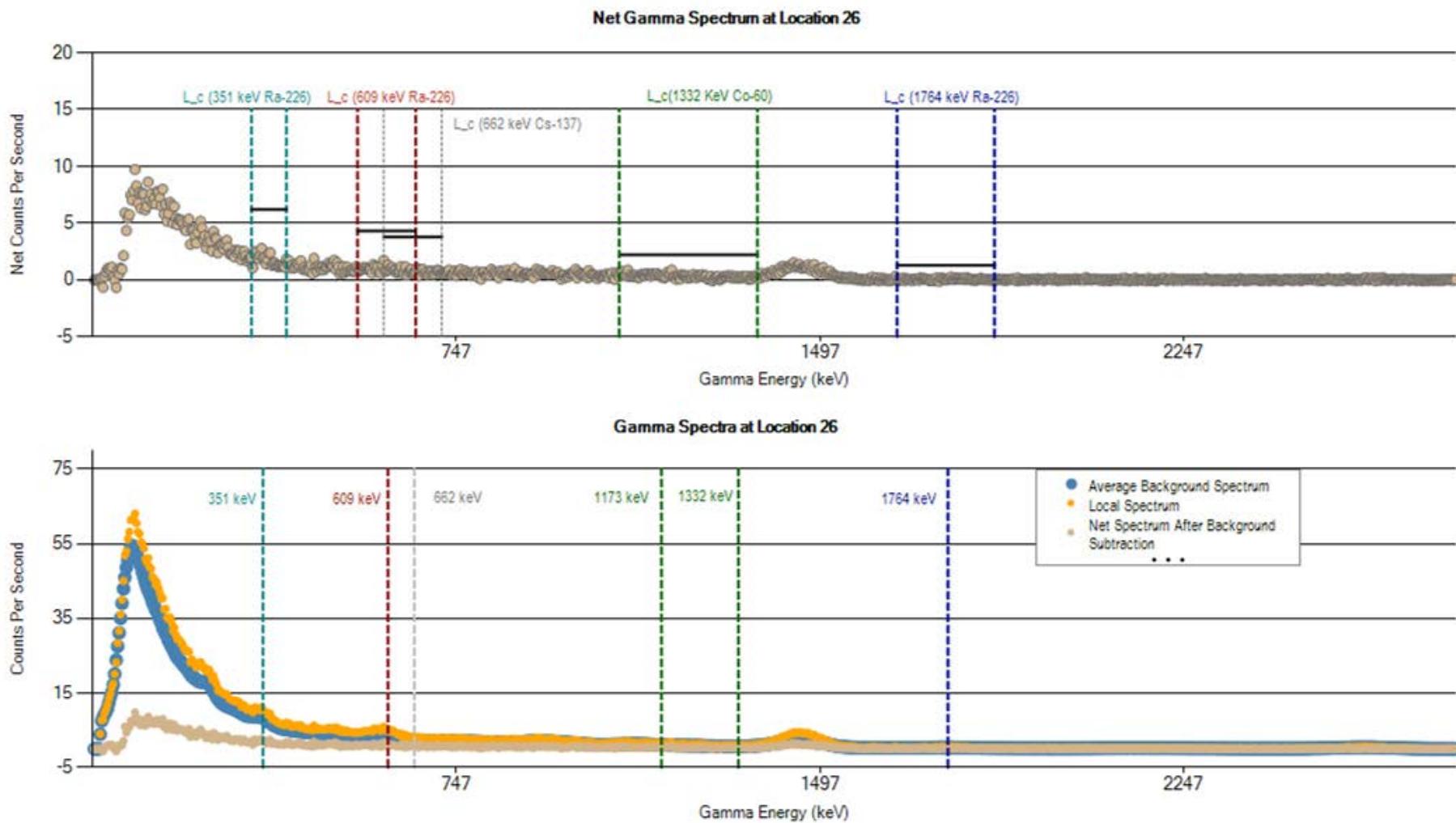
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 23 (cps)	1025	139	25	26	182	166	131	210	111	4154
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



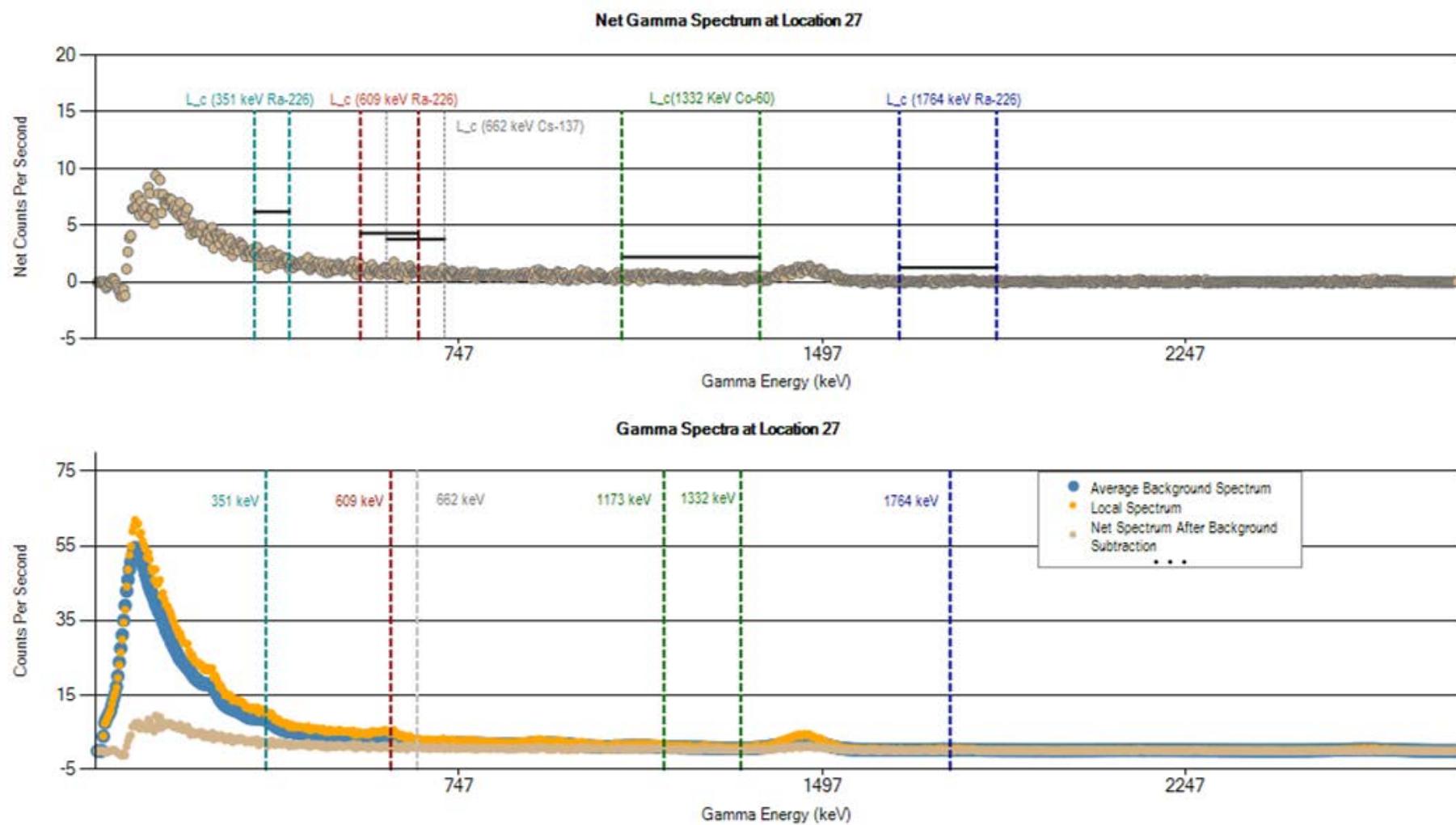
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 24 (cps)	1033	137	26	26	182	166	131	212	113	4031
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



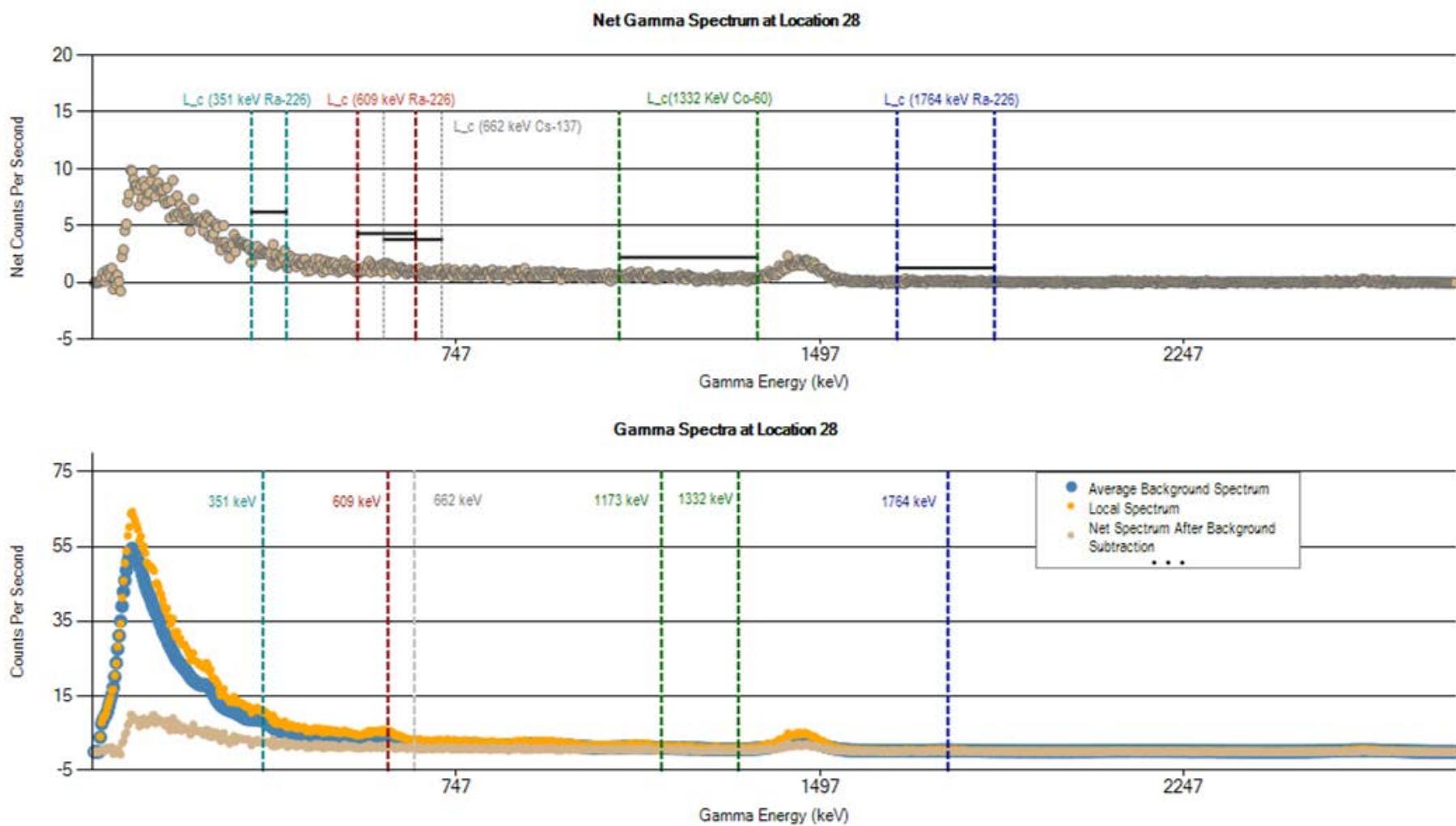
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 25 (cps)	1116	158	24	28	194	179	139	219	124	4346
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



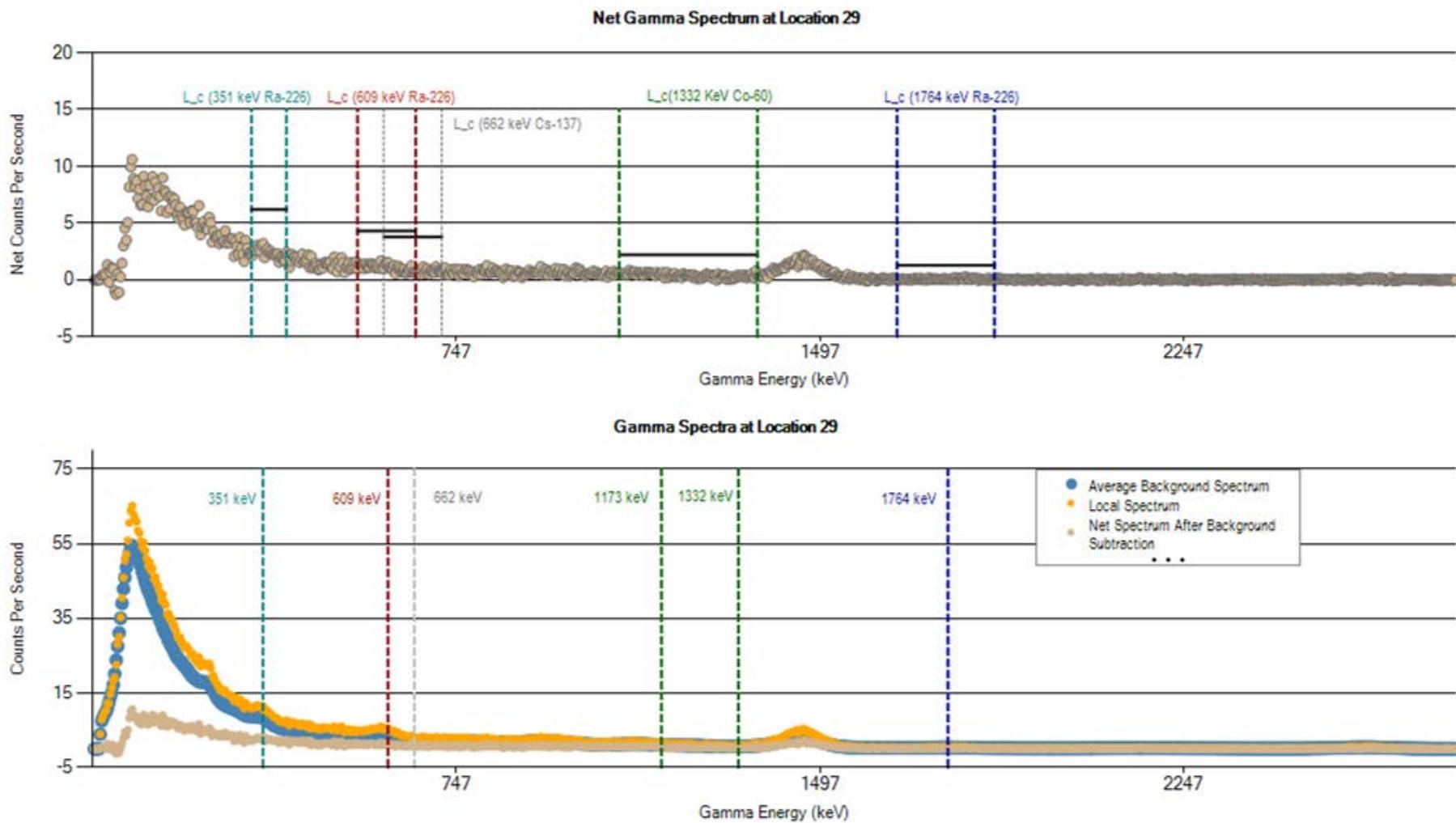
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 26 (cps)	1106	162	24	27	191	177	138	217	120	4342
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



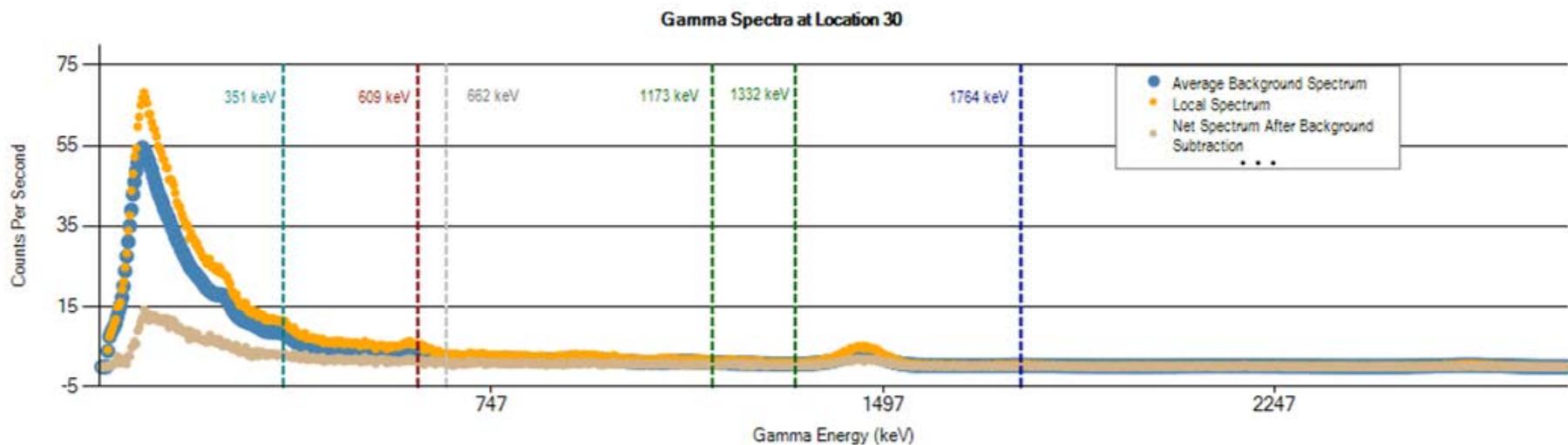
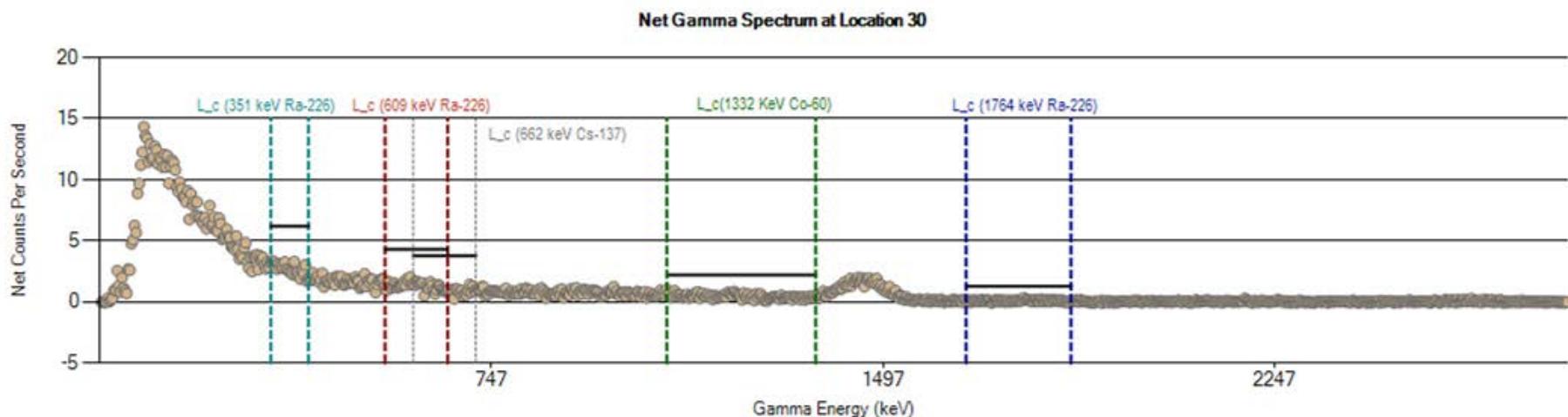
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 27 (cps)	1144	159	26	29	200	182	143	227	126	4397
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



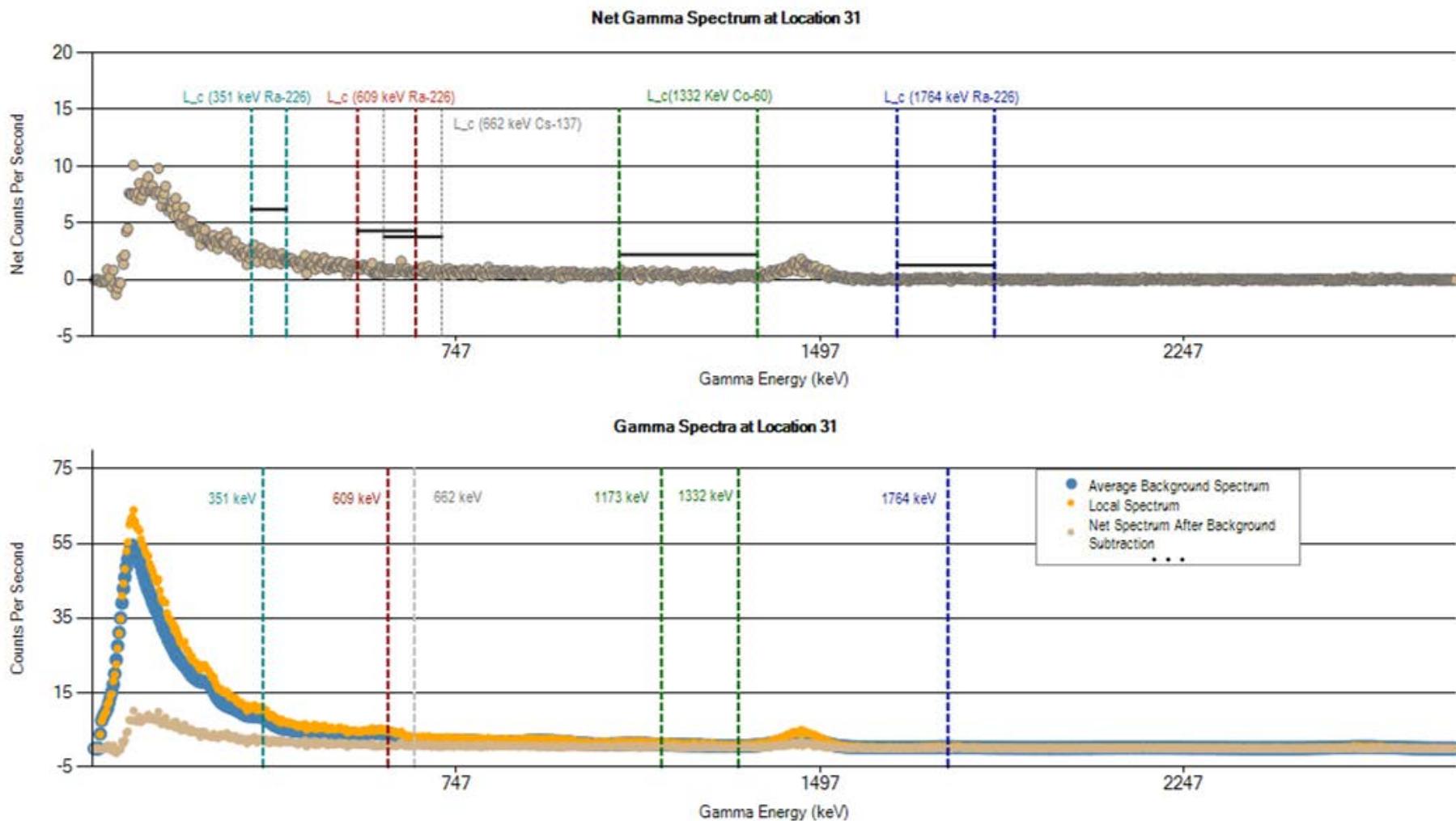
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 28 (cps)	1199	179	27	29	204	189	149	234	132	4550
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



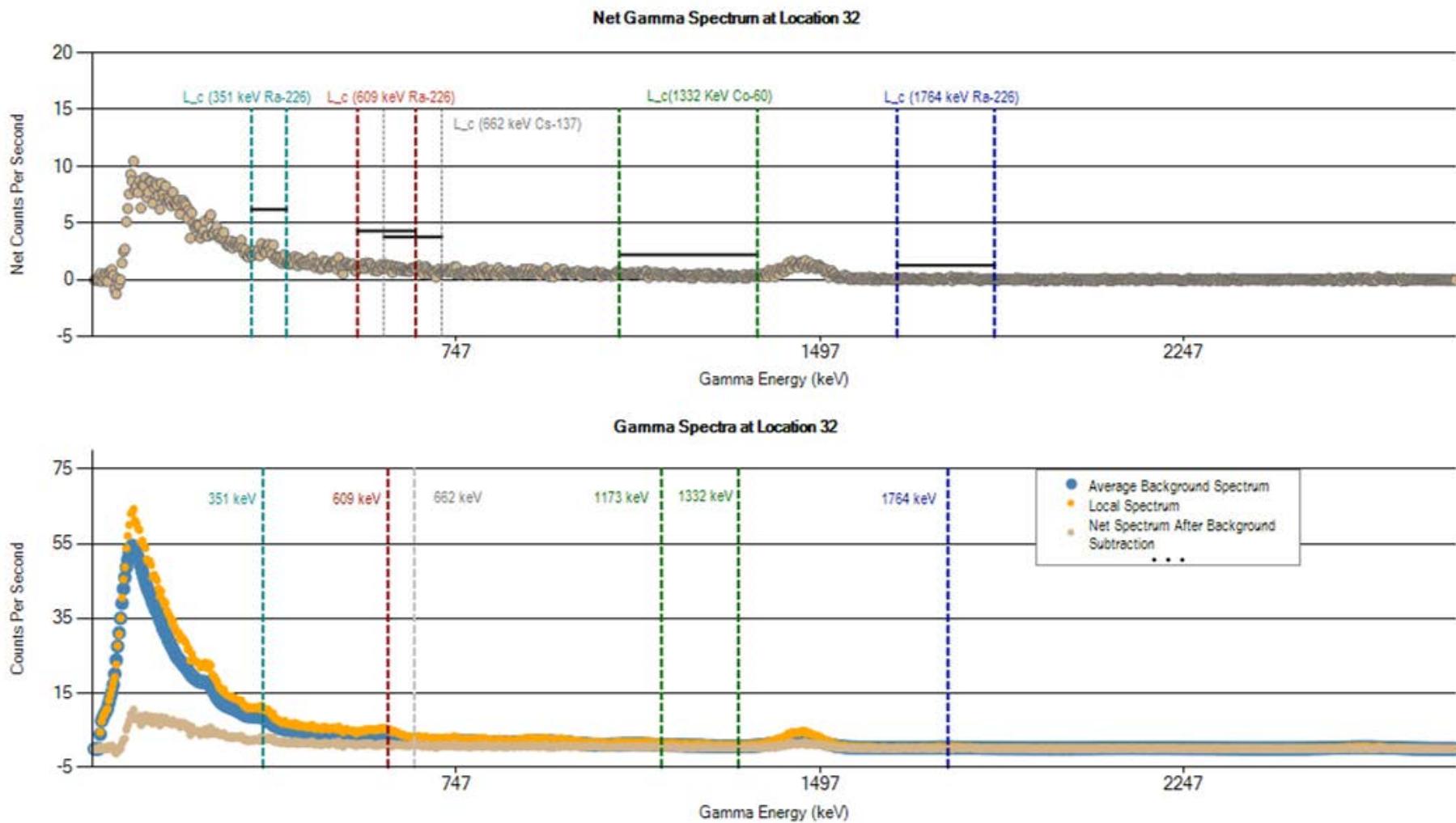
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 29 (cps)	1174	177	26	29	201	184	144	234	127	4488
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



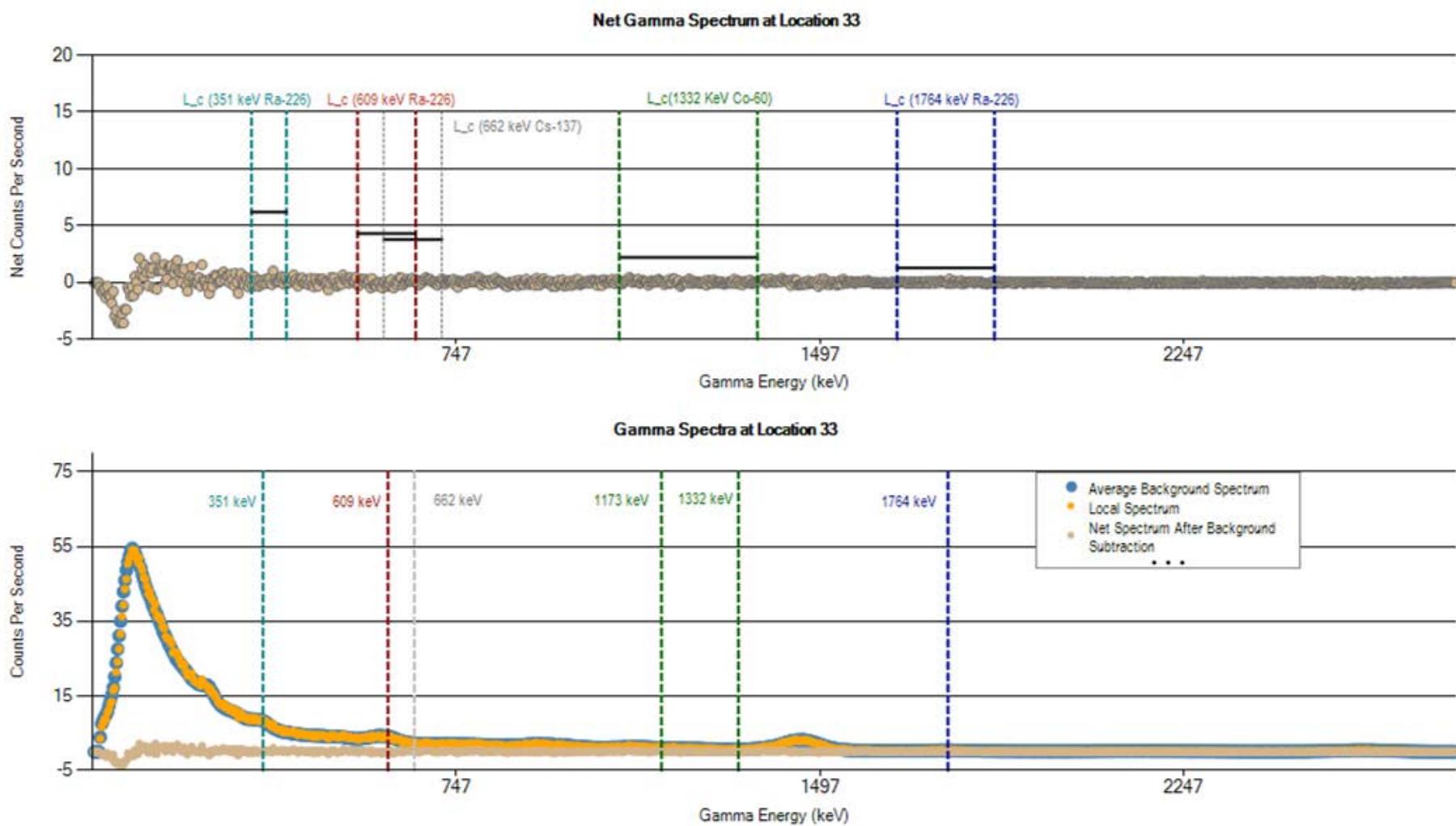
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 30 (cps)	1223	182	27	29	212	194	150	240	132	4729
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



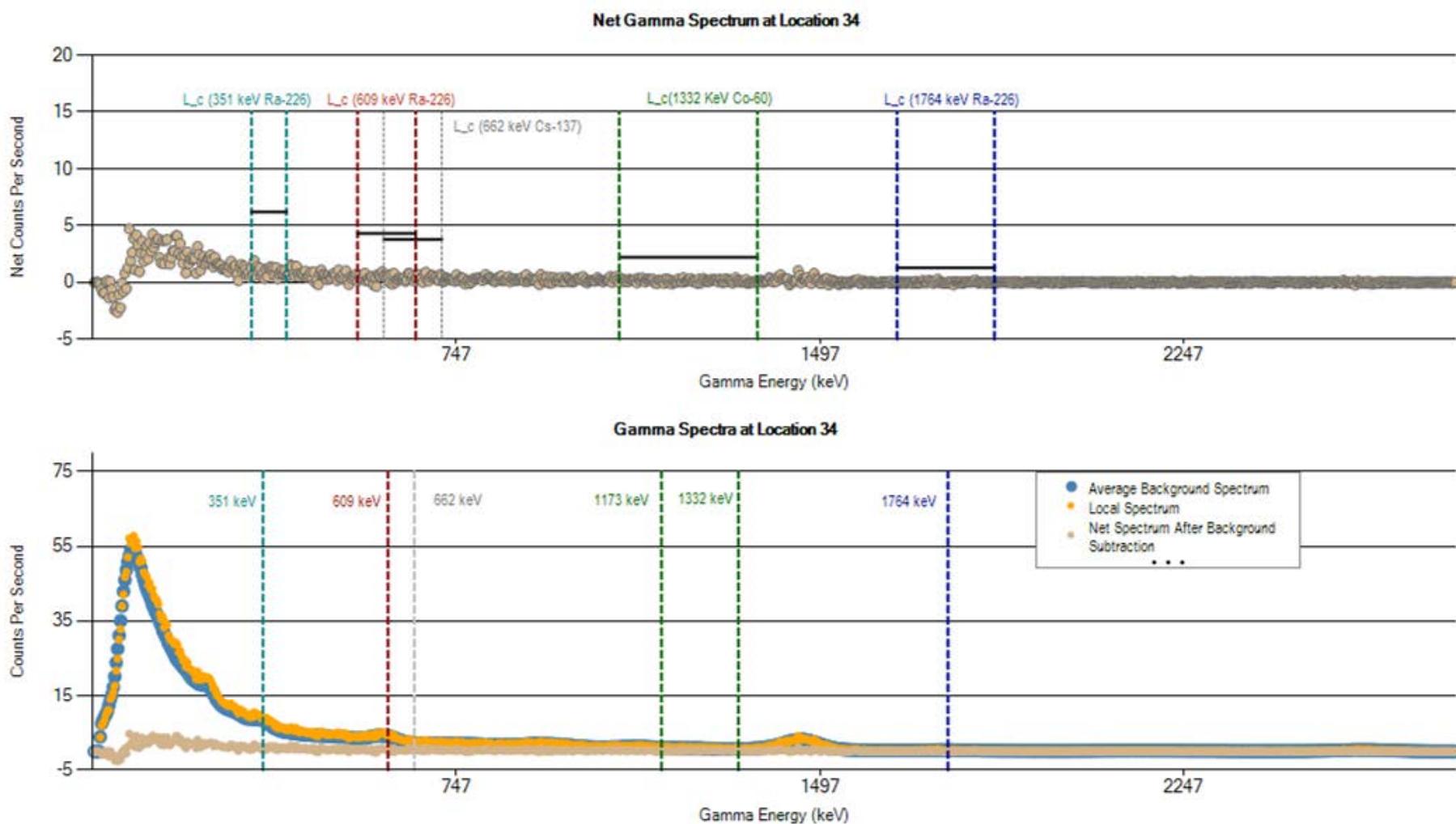
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 31 (cps)	1127	160	25	27	199	176	140	226	126	4393
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



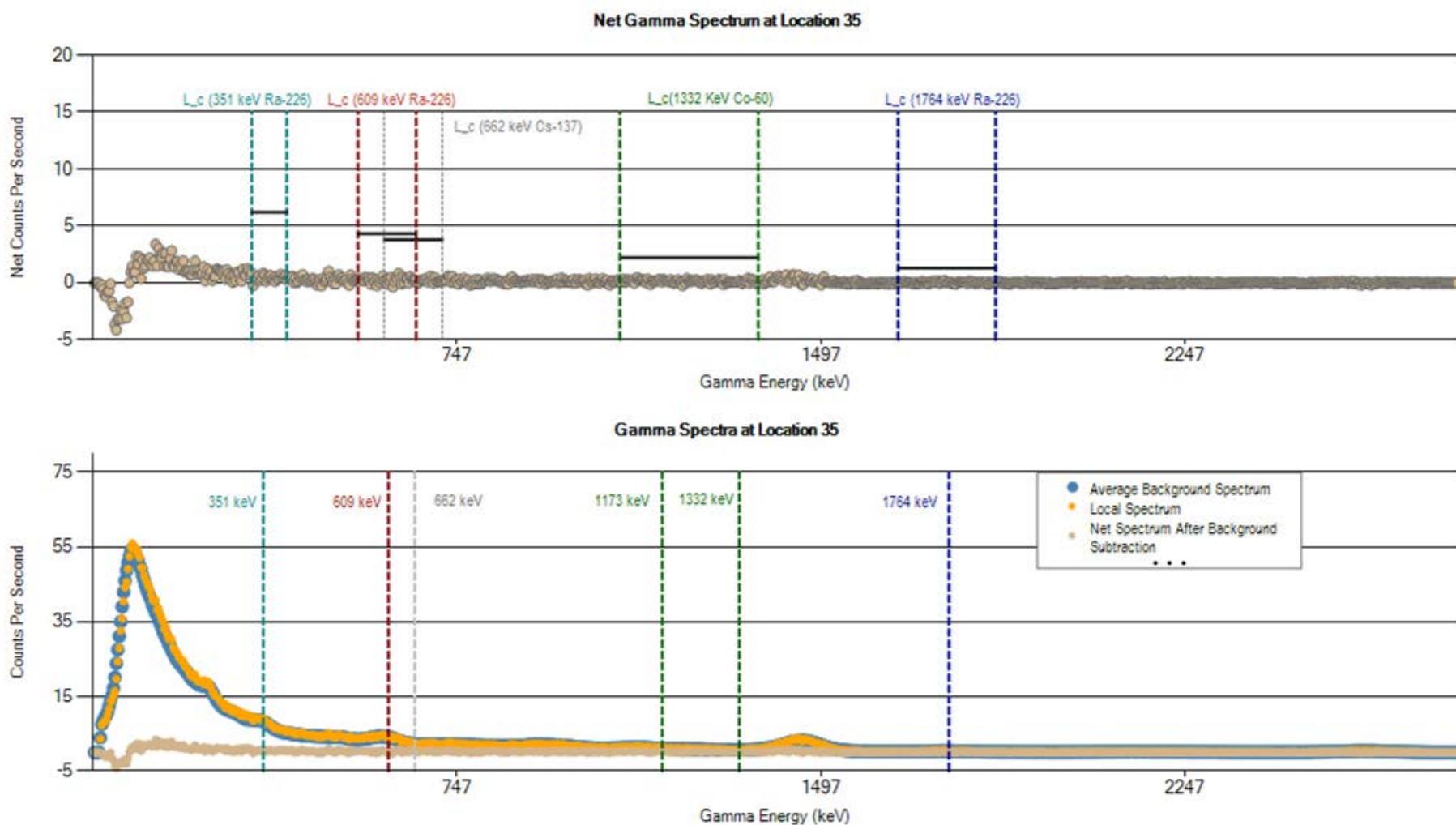
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 32 (cps)	1162	167	26	28	202	184	145	231	128	4478
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



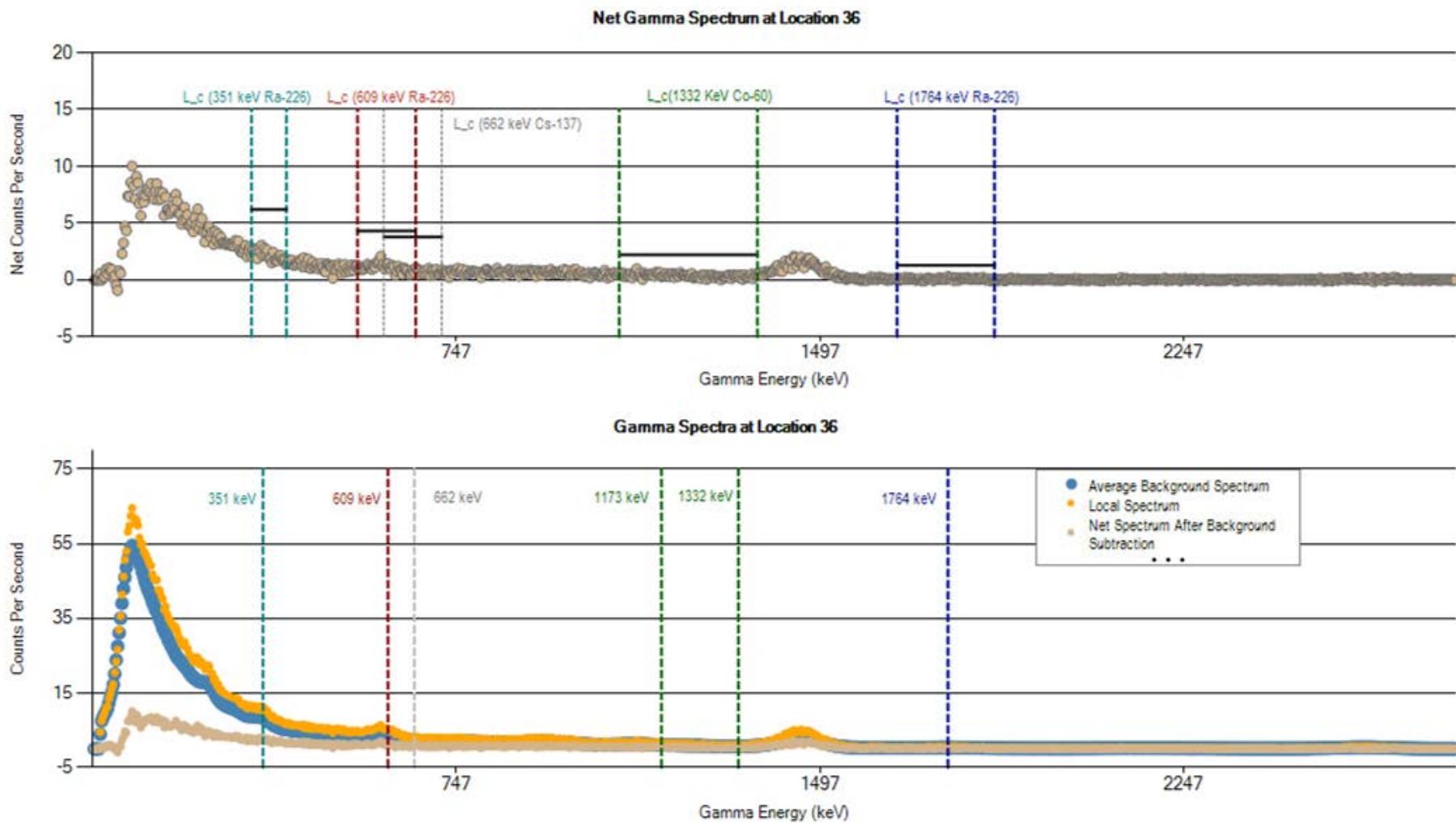
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 33 (cps)	870	118	22	21	155	141	110	178	93	3632
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



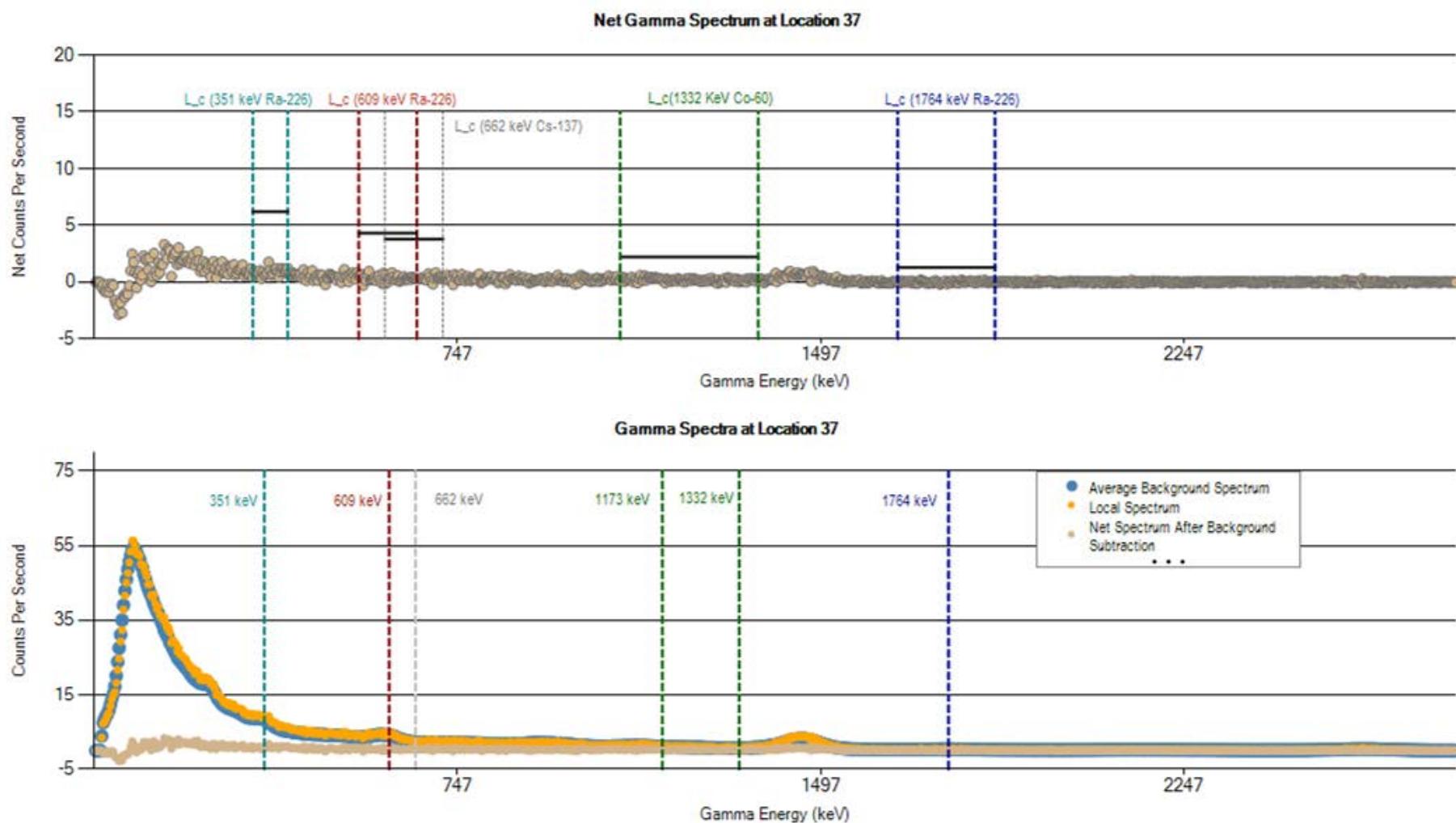
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 34 (cps)	962	127	22	24	170	156	123	198	103	3916
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



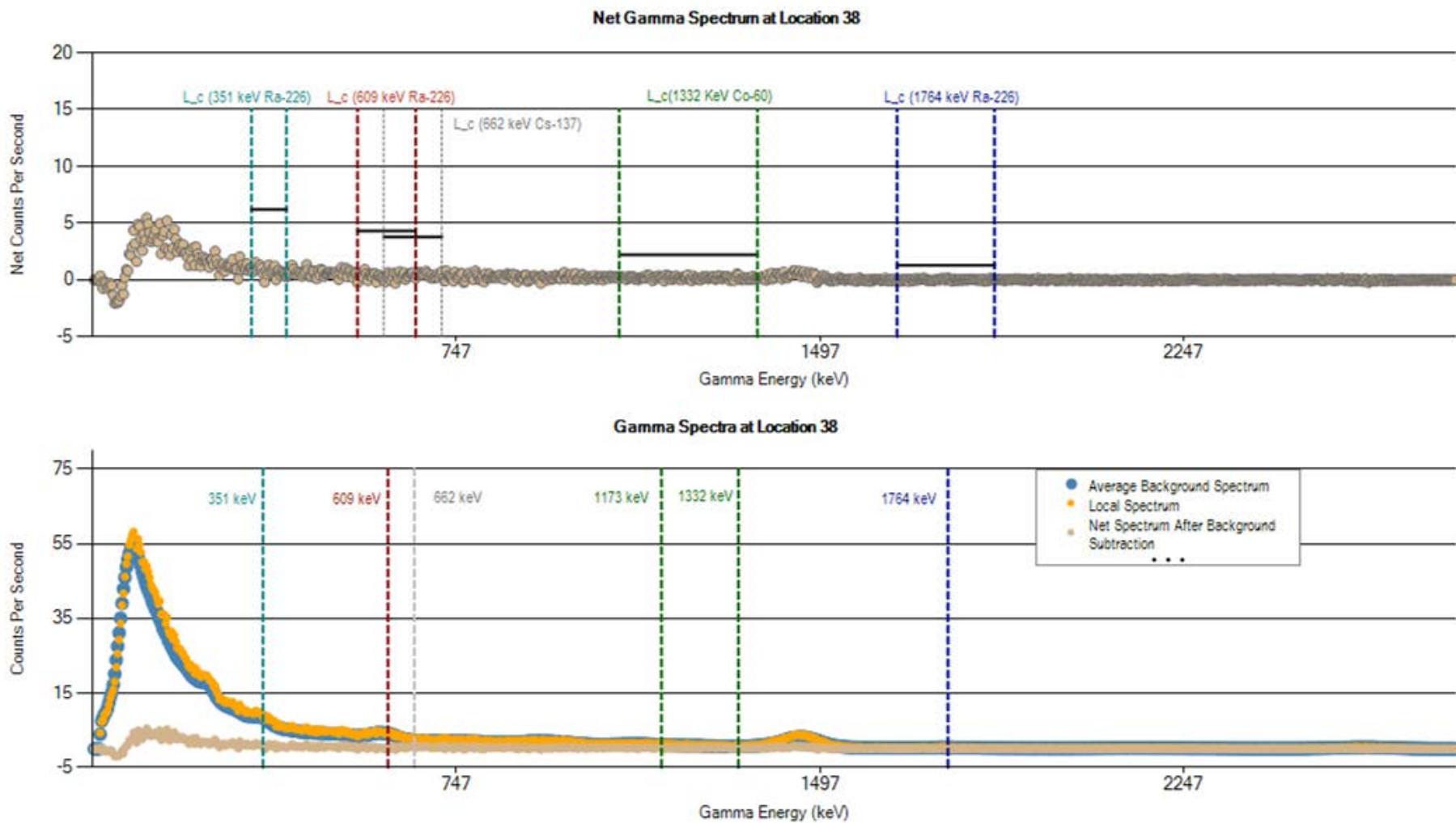
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 35 (cps)	925	127	22	24	161	150	117	185	101	3762
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



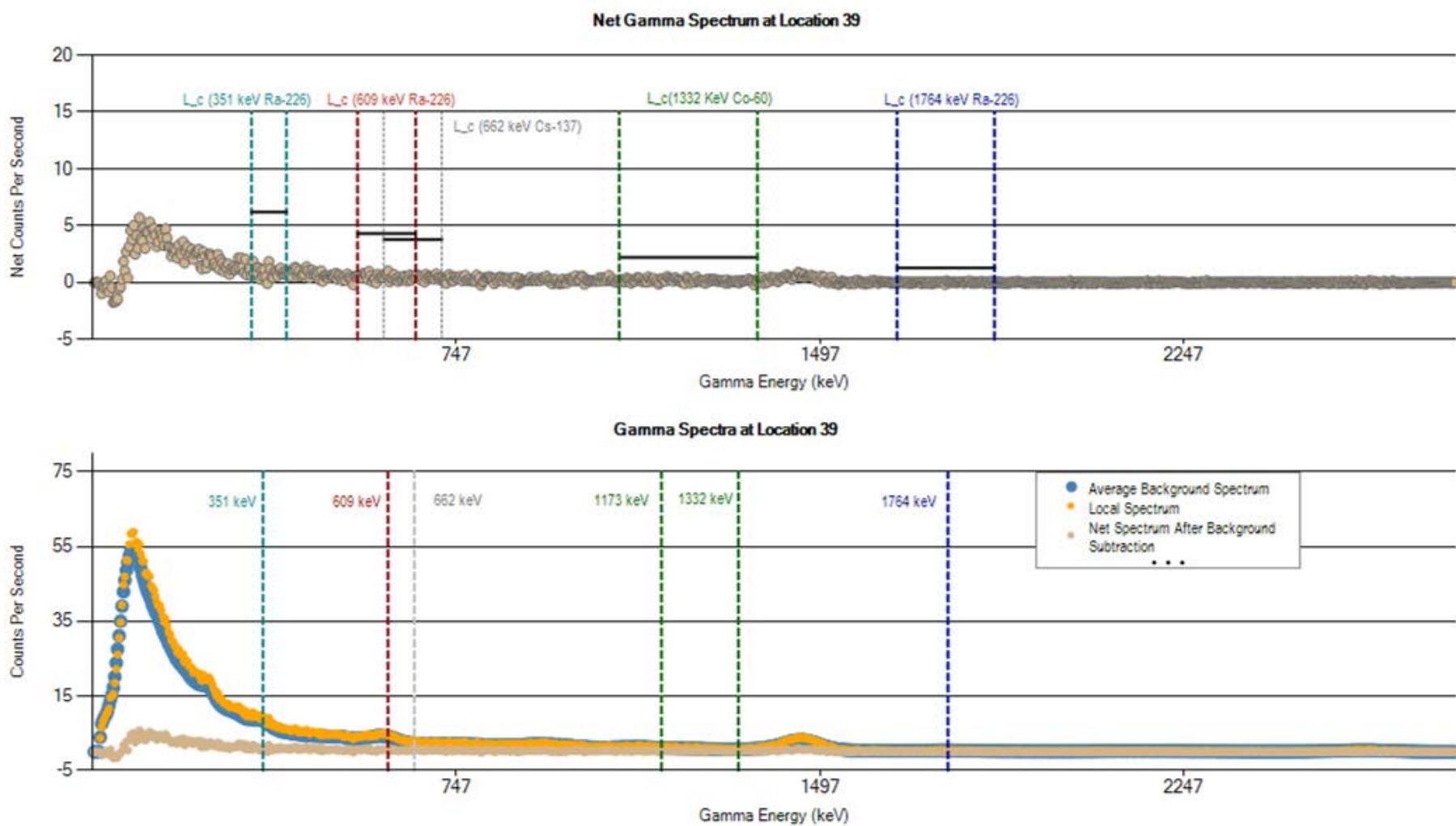
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 36 (cps)	1158	177	26	29	194	183	140	227	124	4452
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



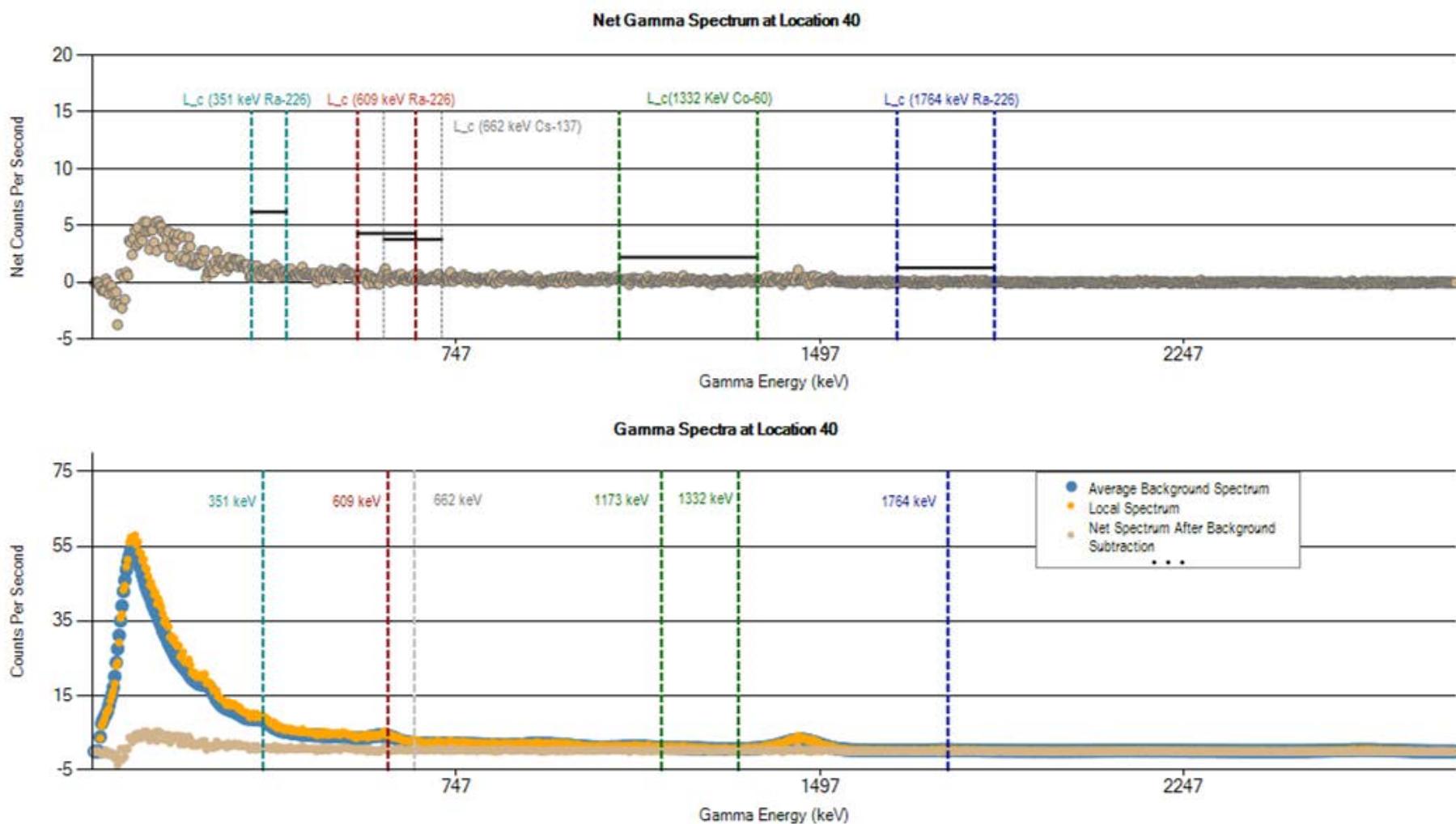
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 37 (cps)	974	139	21	25	169	154	122	197	108	3856
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



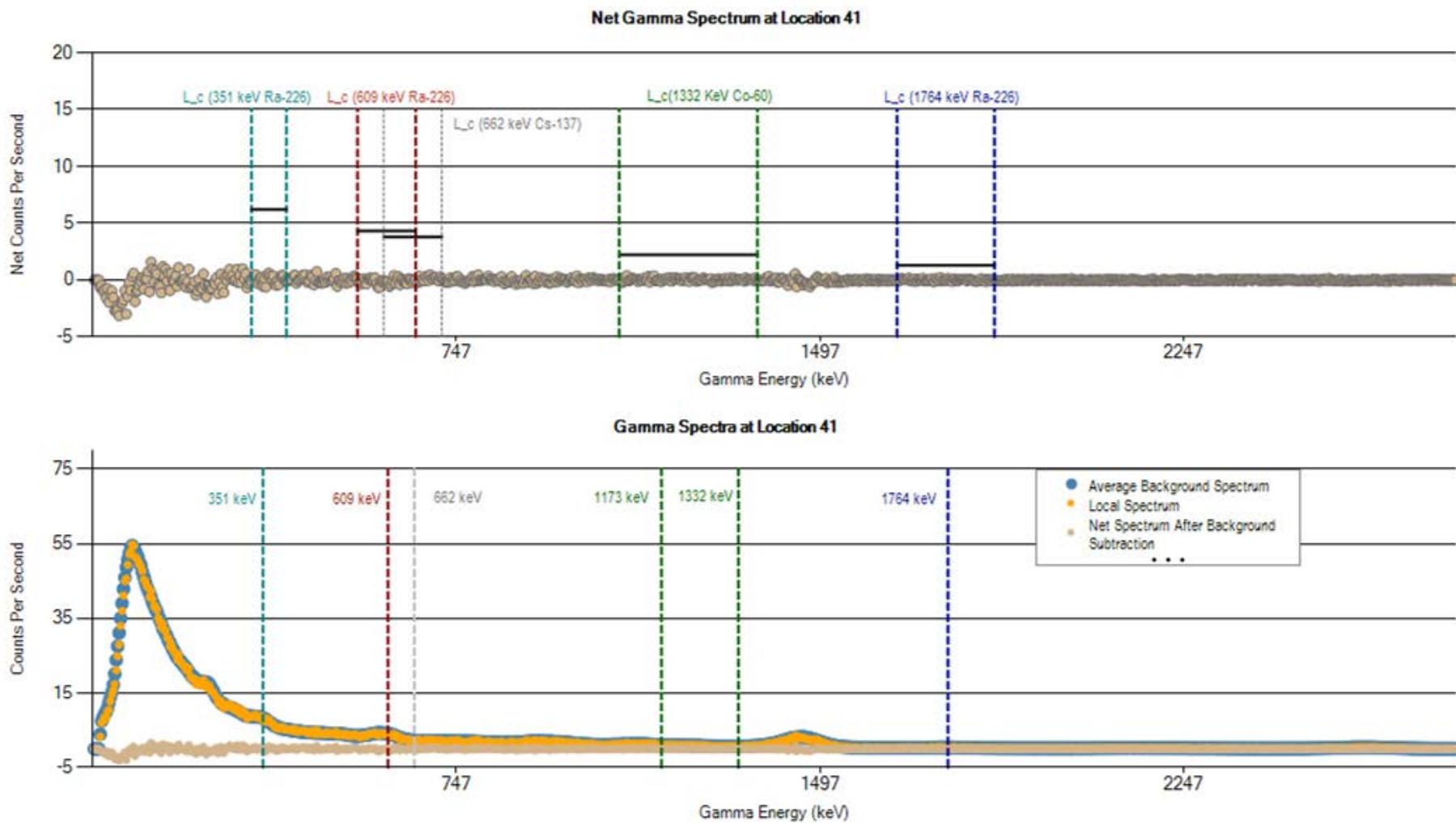
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 38 (cps)	971	132	22	24	171	154	123	193	106	3940
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



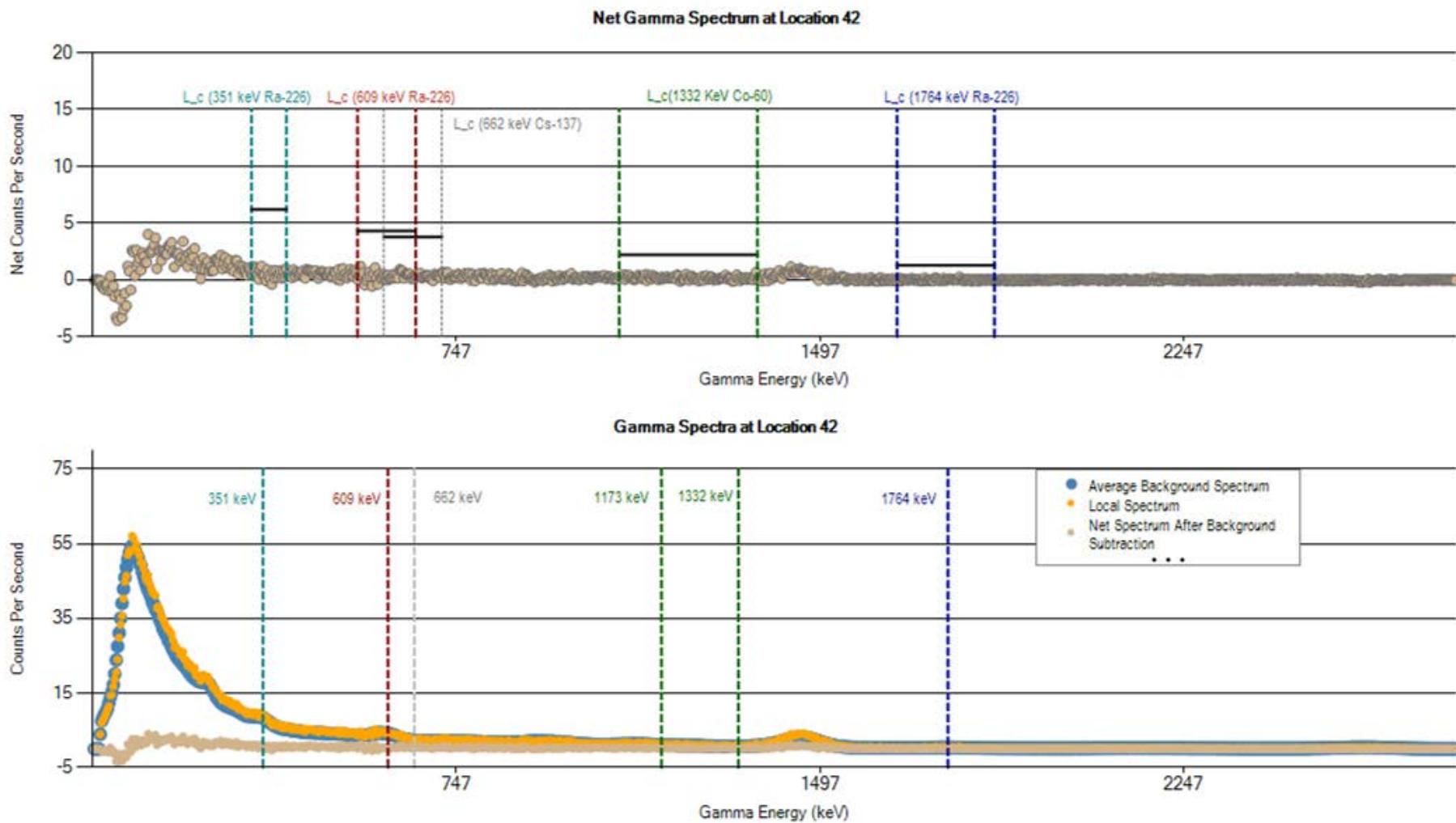
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 39 (cps)	982	135	22	24	172	160	125	197	106	3987
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



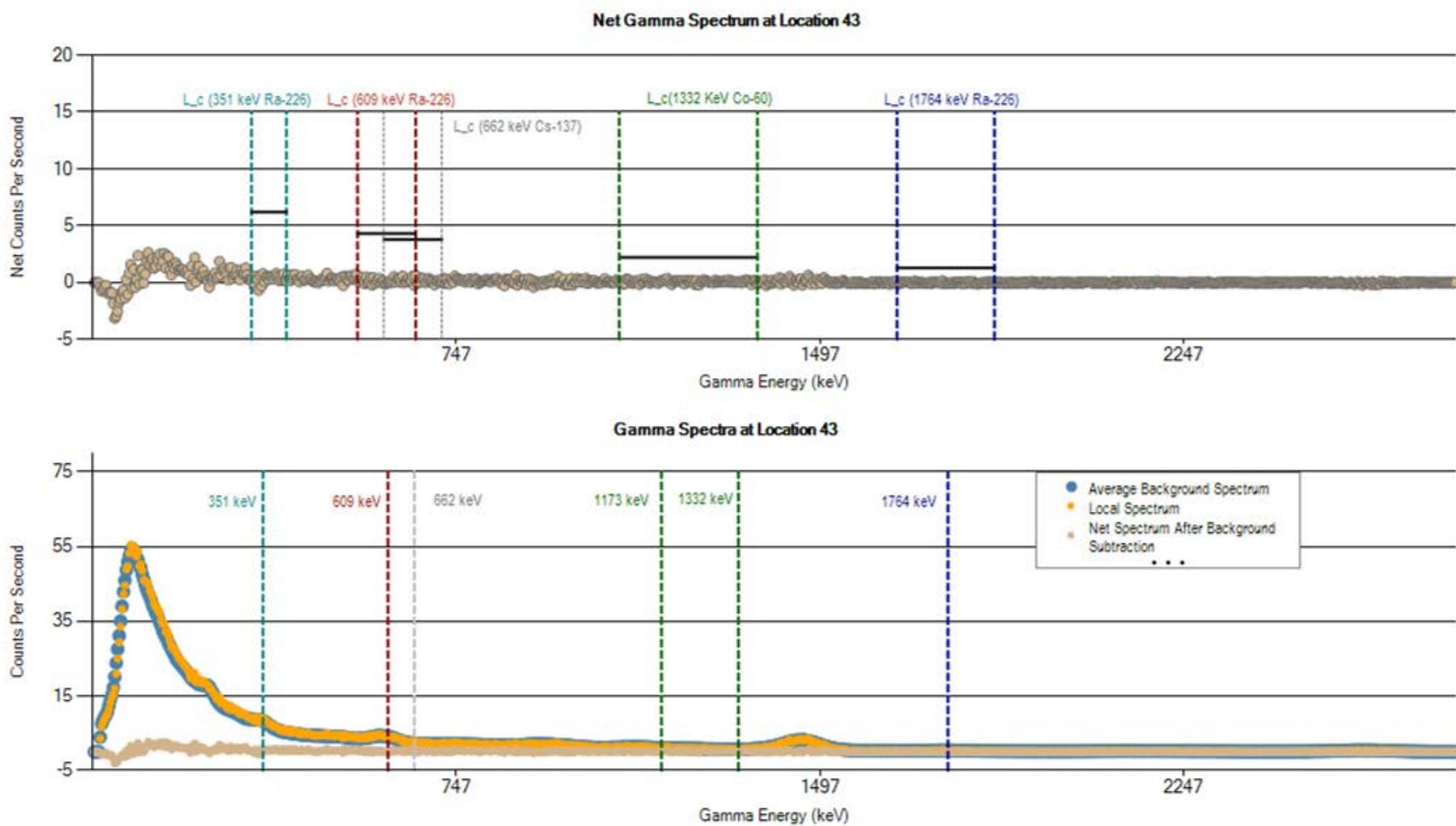
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 40 (cps)	974	129	23	22	176	157	124	197	104	3974
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



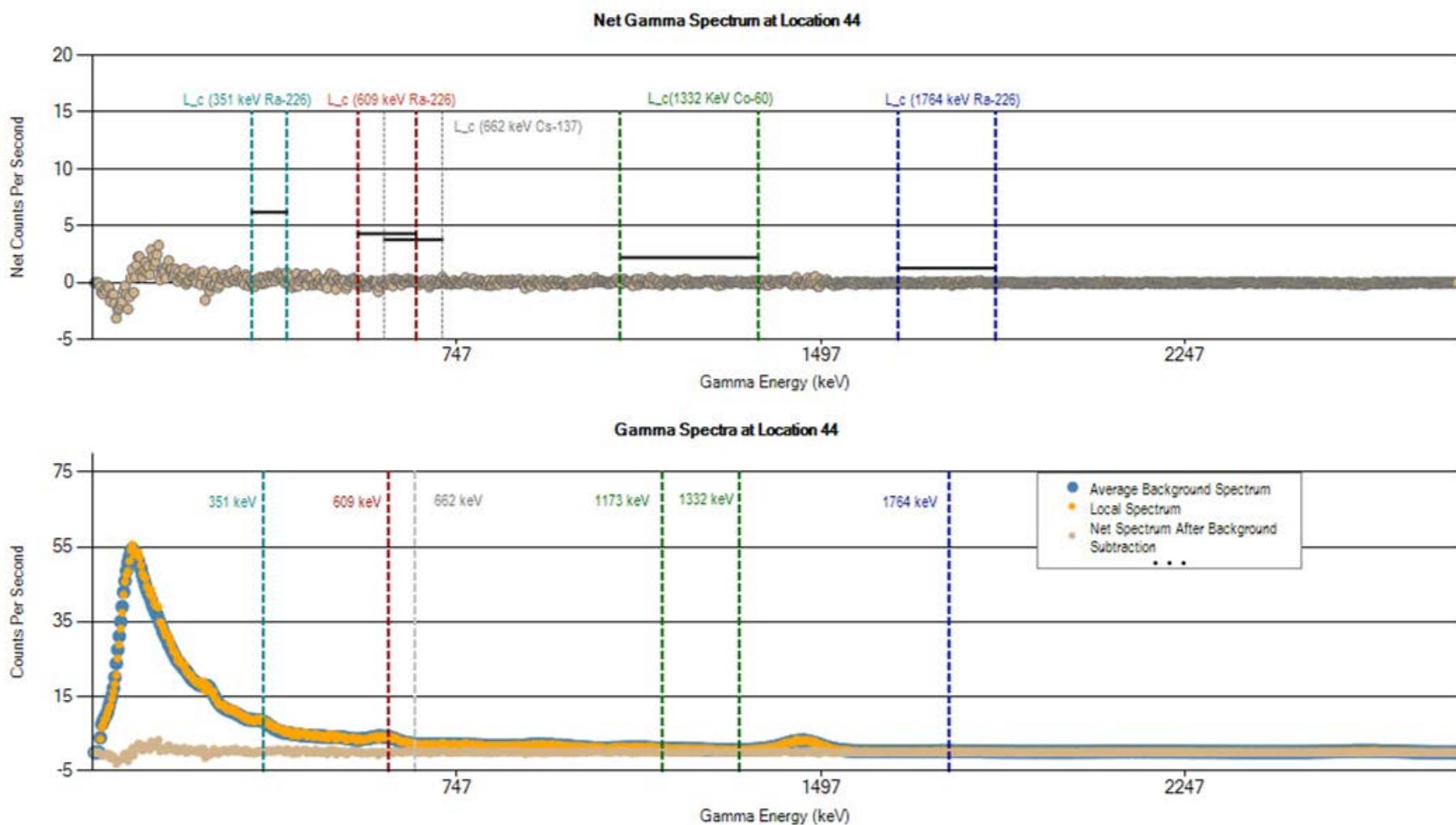
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 41 (cps)	845	111	20	22	151	135	107	176	92	3562
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



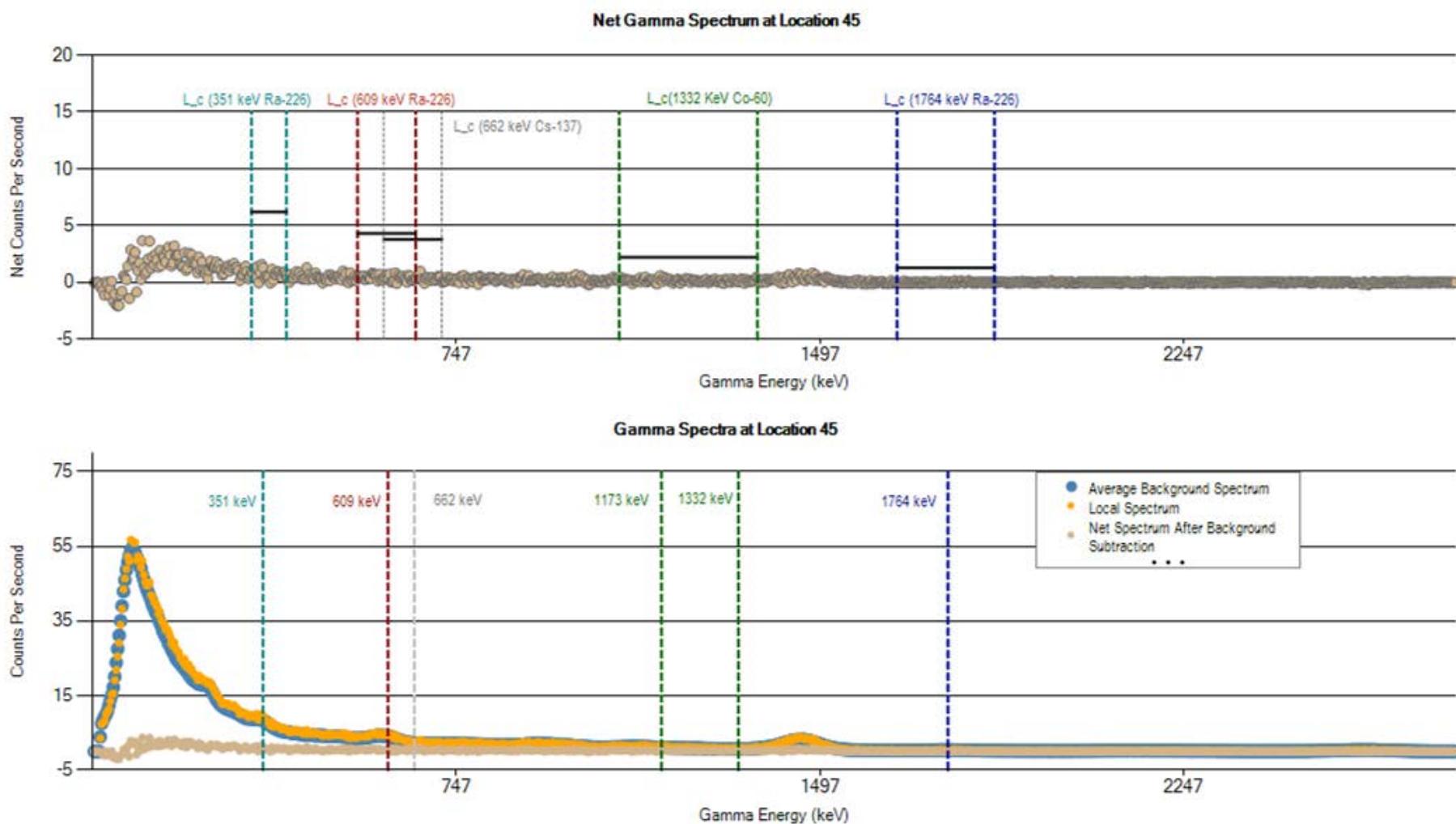
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 42 (cps)	969	141	22	22	170	154	122	188	105	3864
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



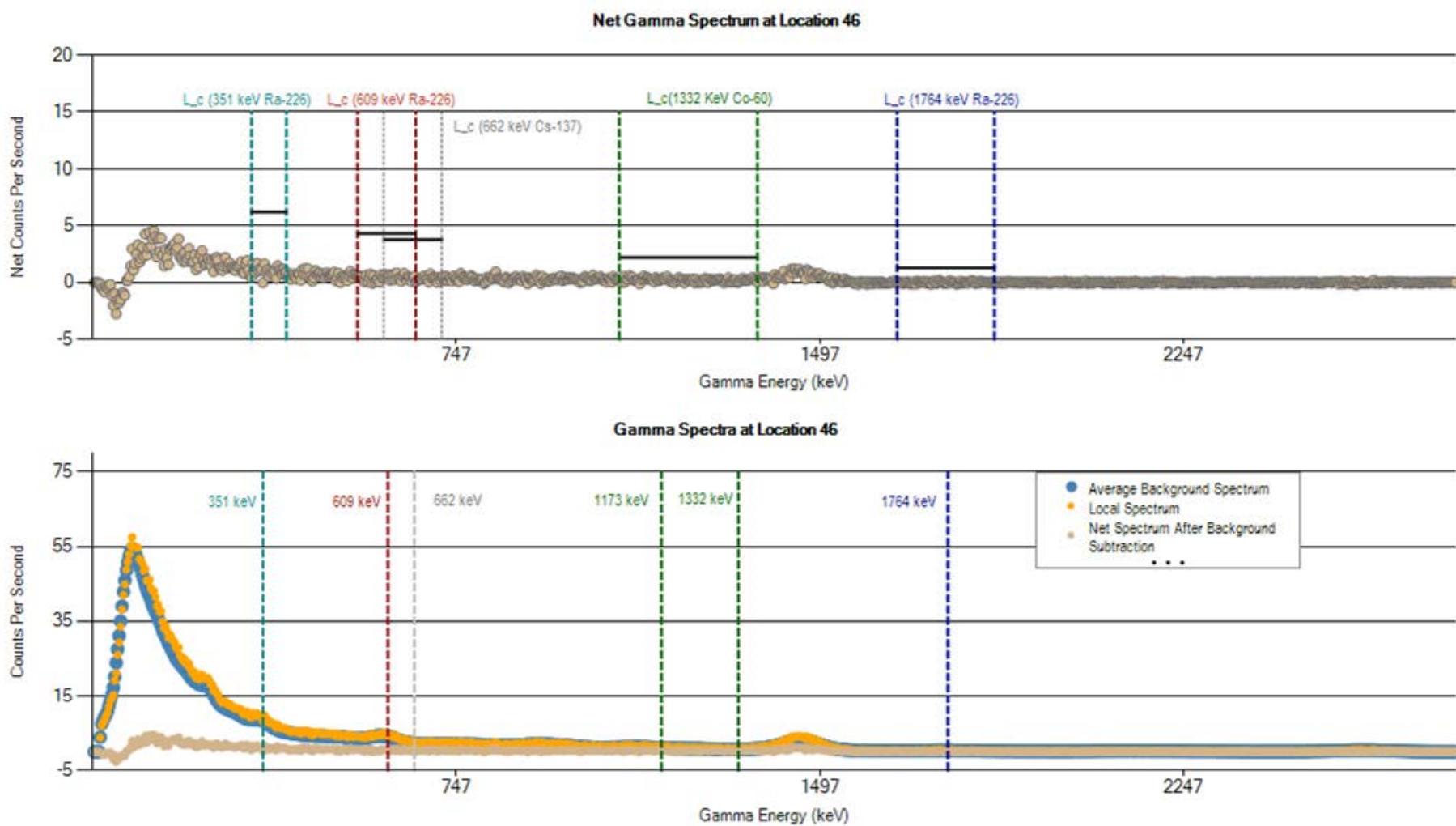
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 43 (cps)	903	121	20	22	162	147	114	183	96	3733
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



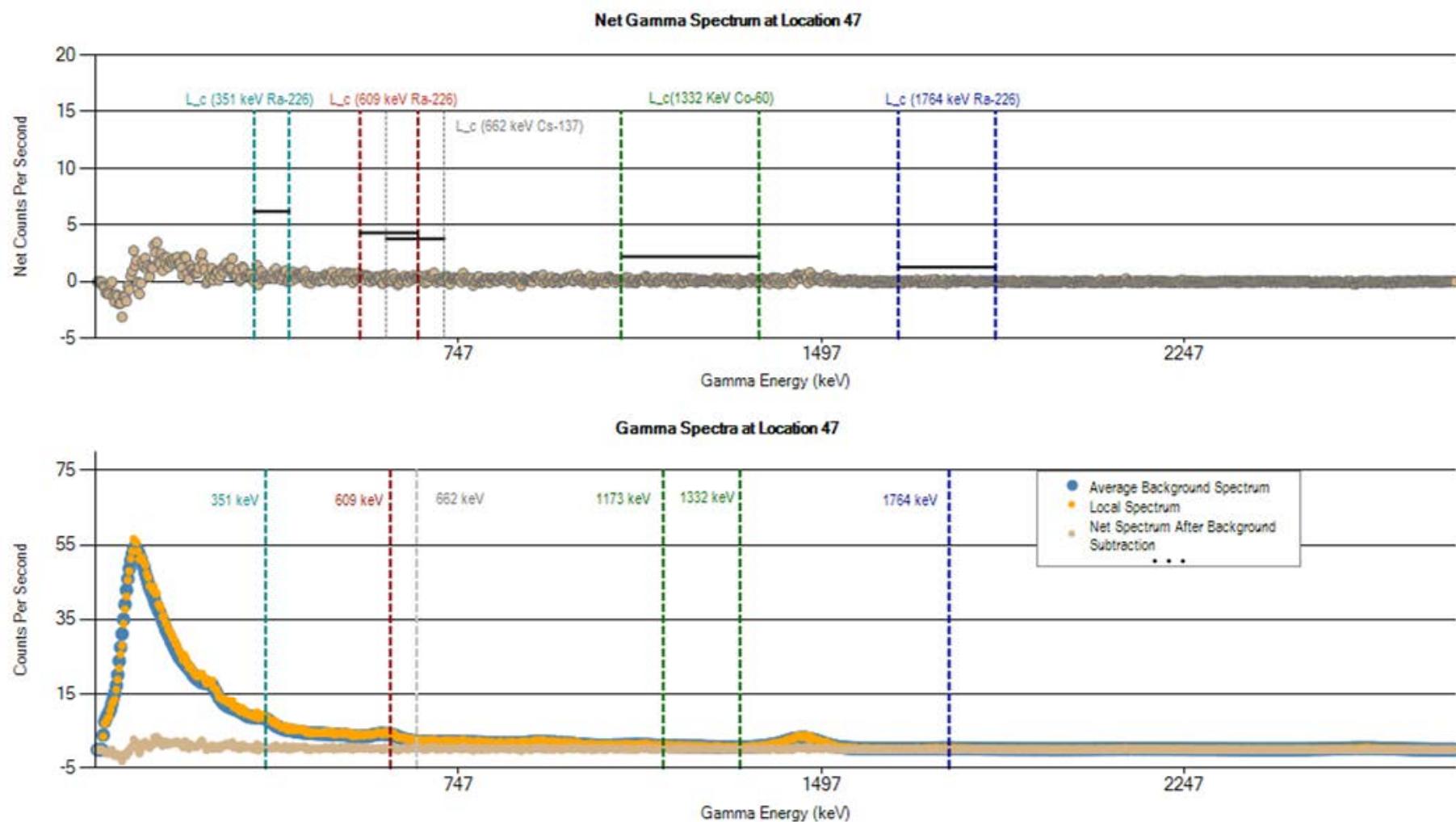
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 44 (cps)	869	117	20	21	154	141	110	181	93	3664
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



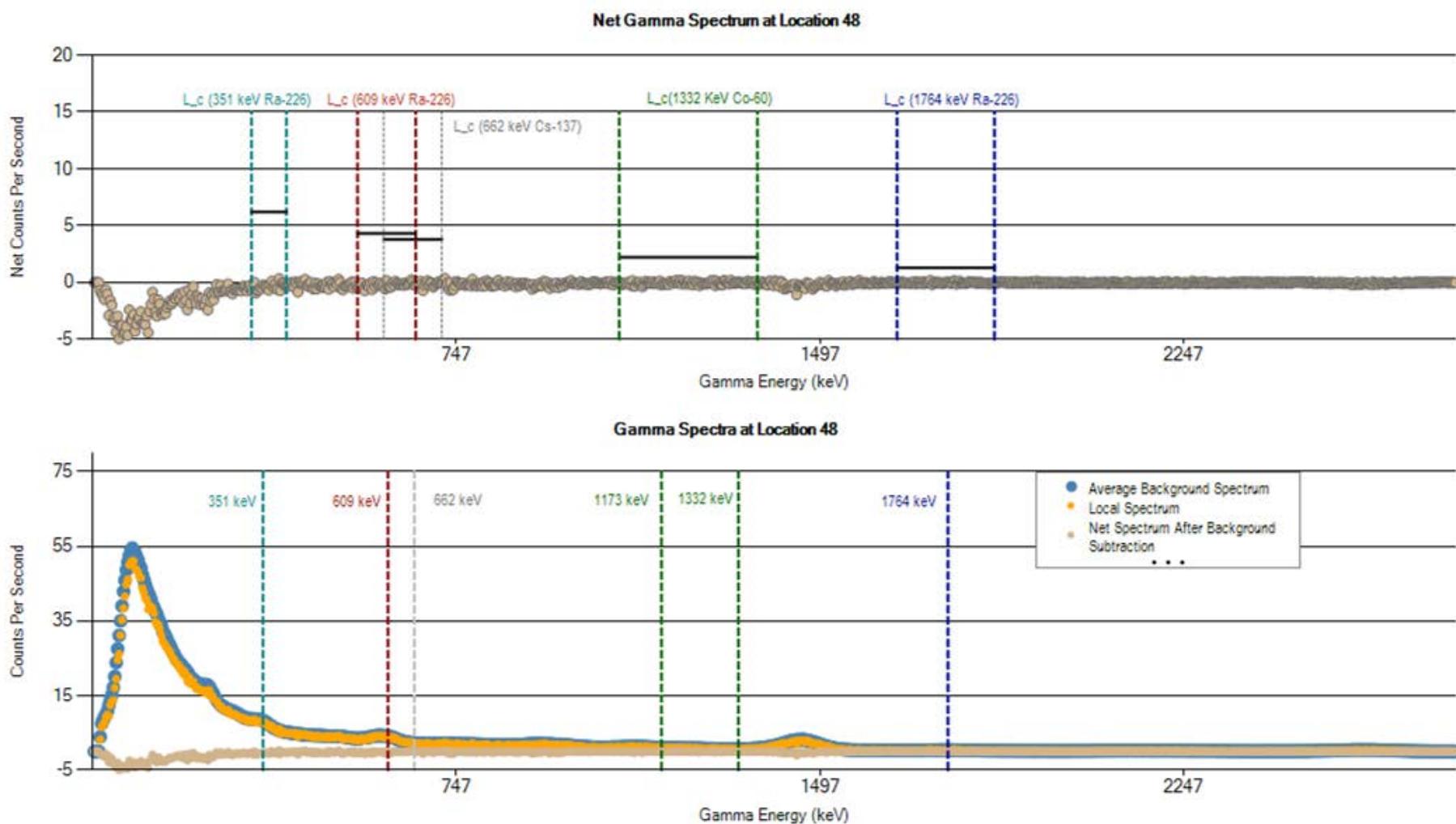
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 45 (cps)	961	132	21	24	168	157	122	193	105	3857
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



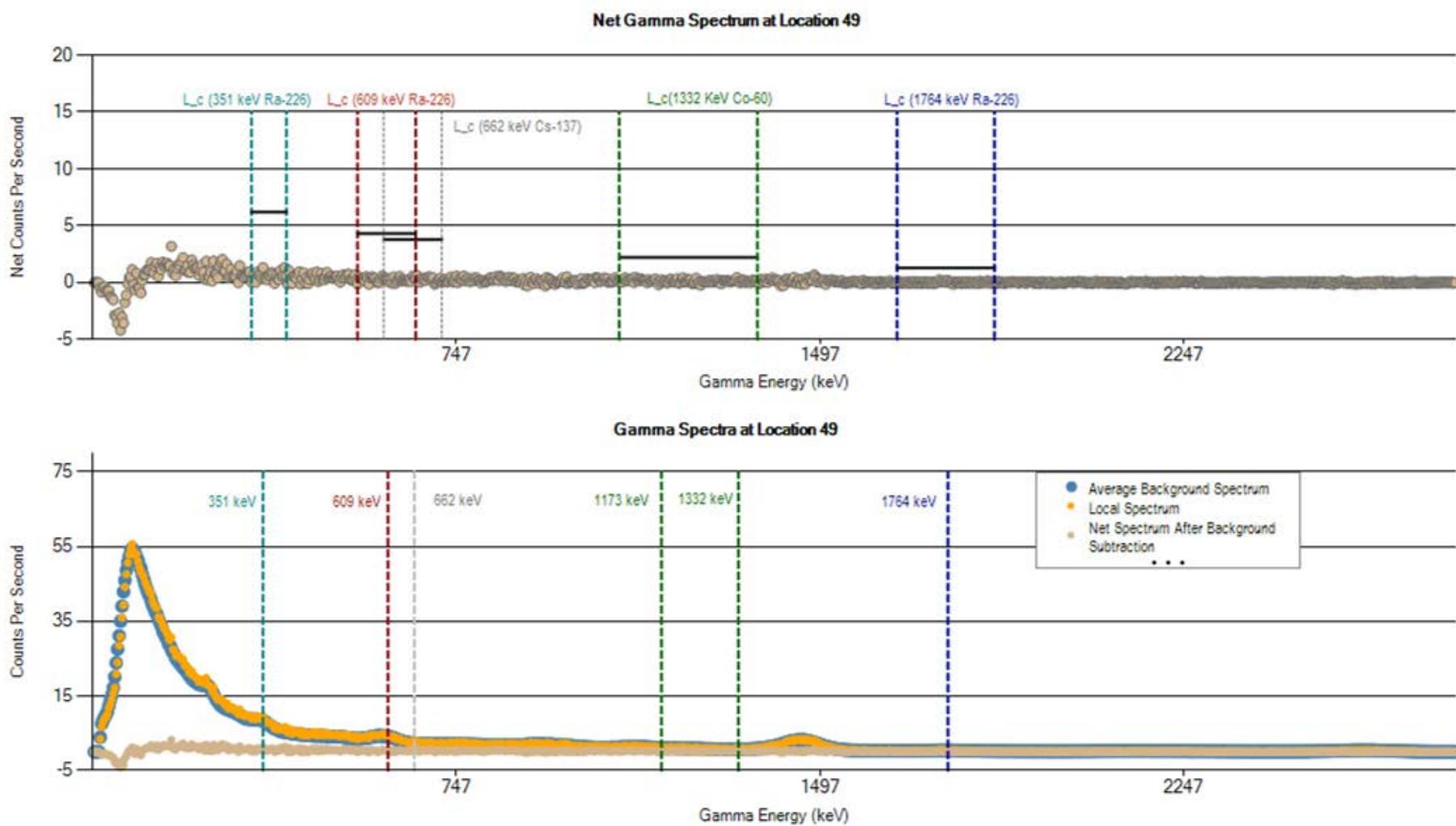
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 46 (cps)	999	147	21	25	173	157	124	200	111	3950
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



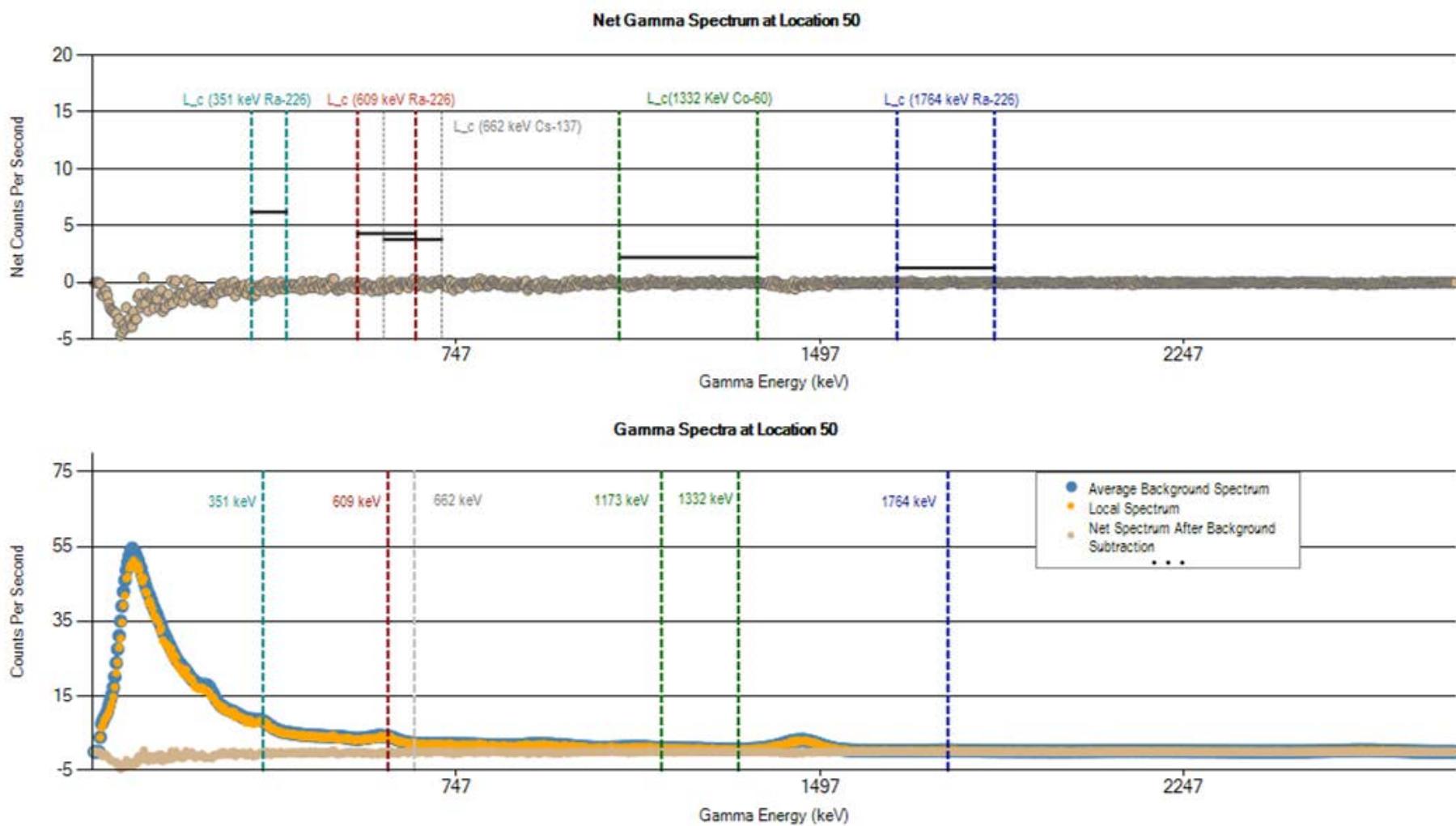
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 47 (cps)	934	127	22	23	167	152	118	187	99	3786
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



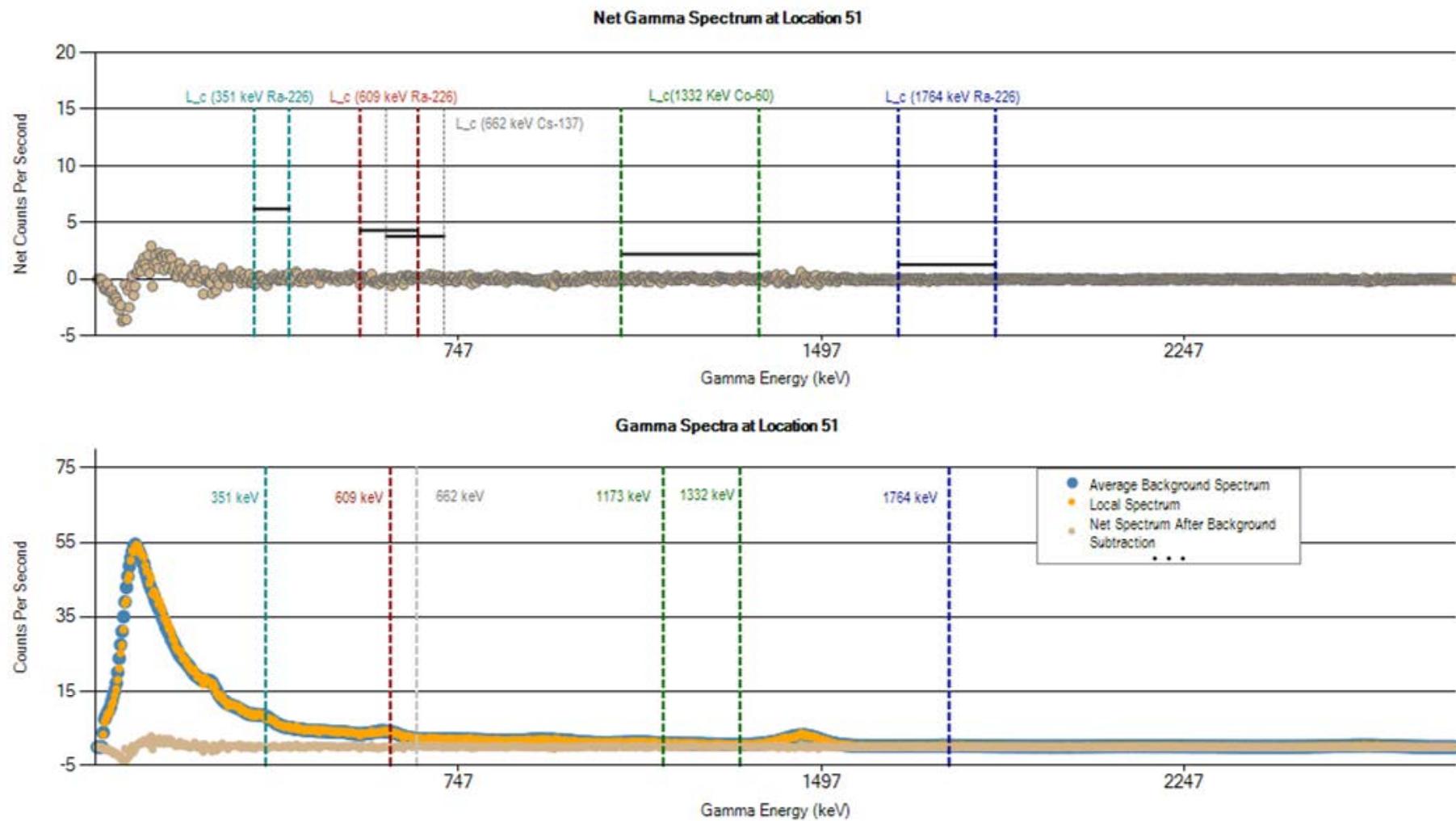
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 48 (cps)	789	102	19	19	141	132	102	165	84	3344
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



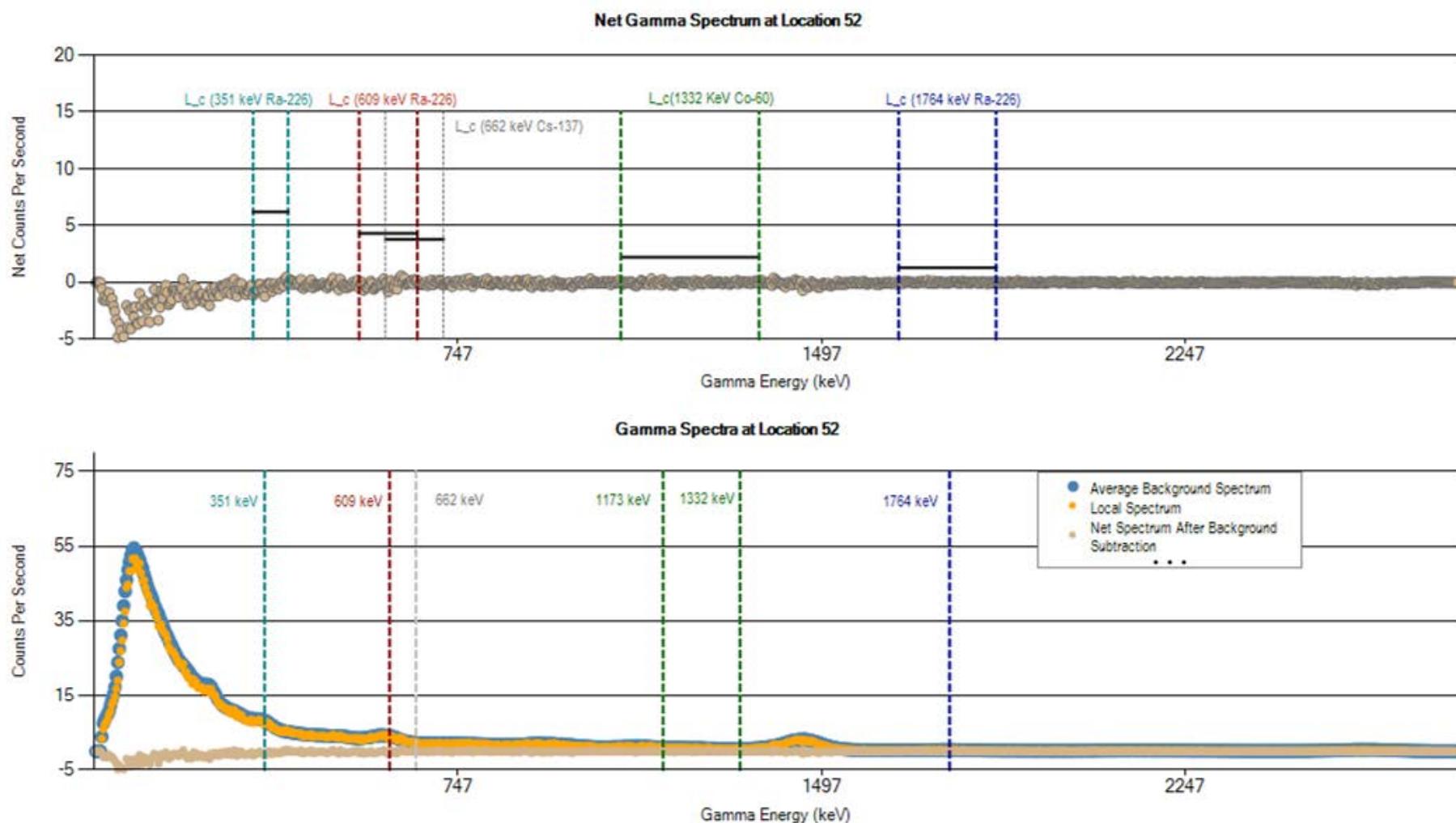
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 49 (cps)	937	124	22	23	167	152	118	188	102	3761
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



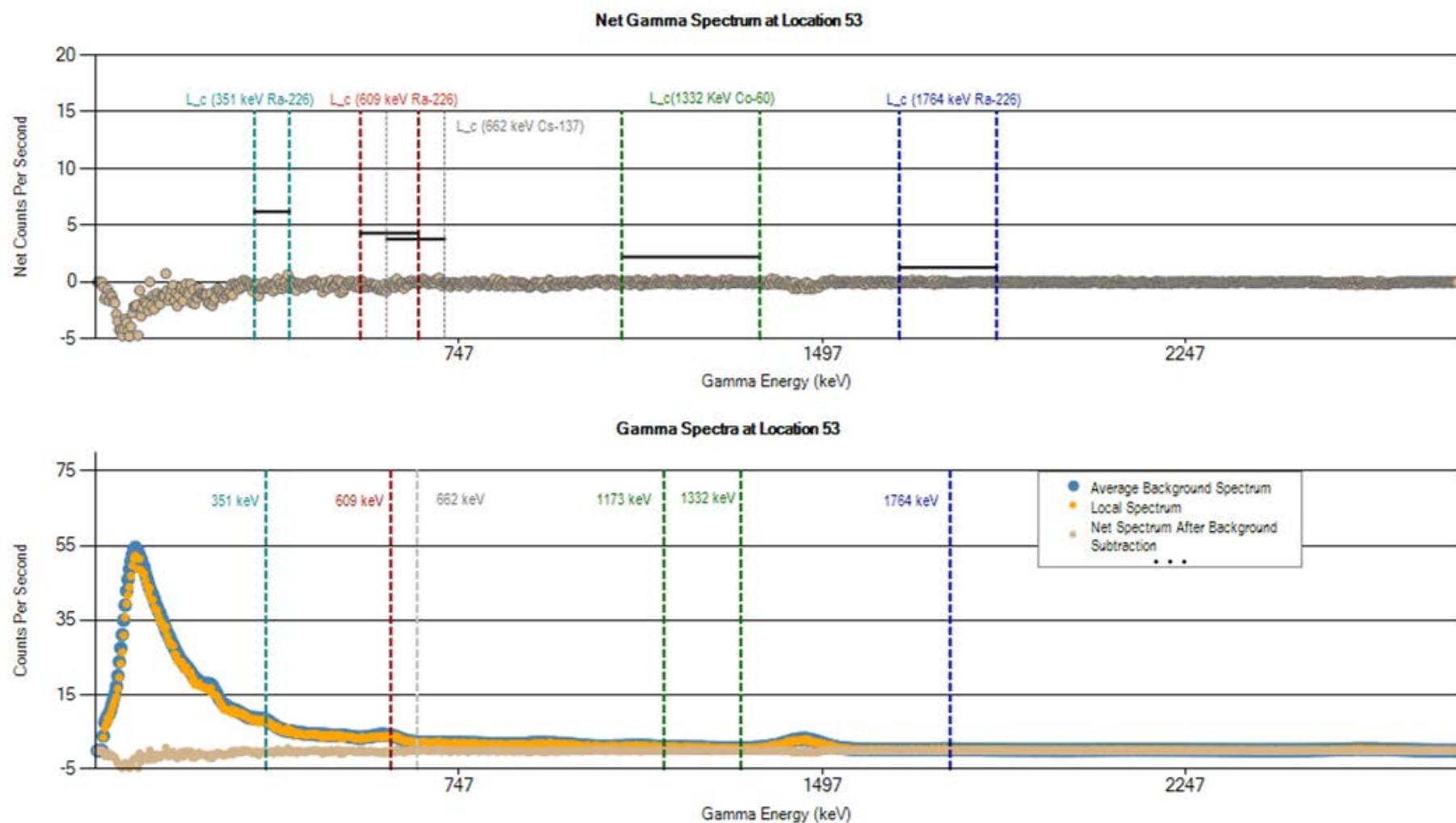
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 50 (cps)	790	107	19	20	141	129	102	163	84	3387
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



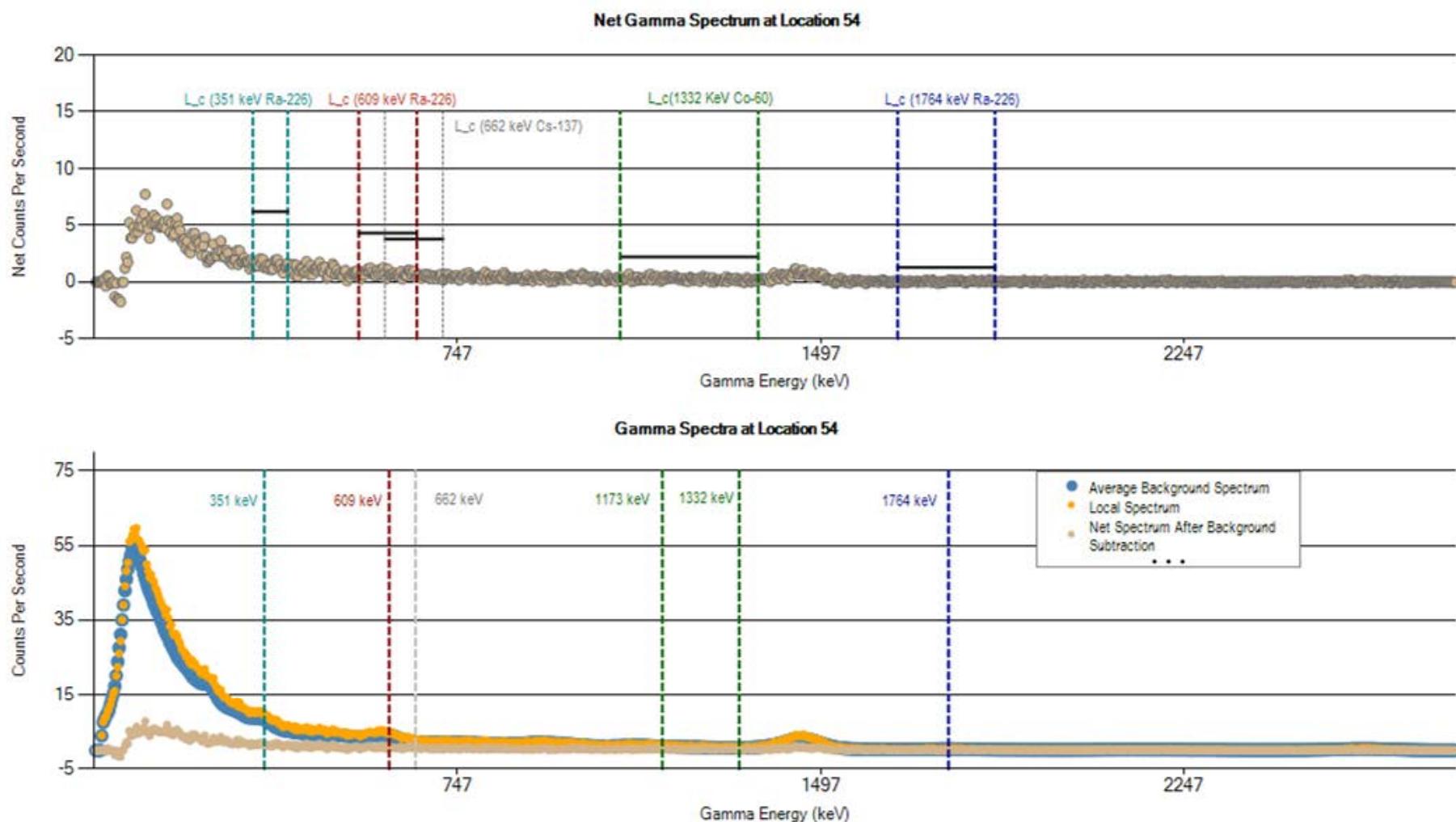
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 51 (cps)	864	117	19	21	156	141	111	175	92	3635
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



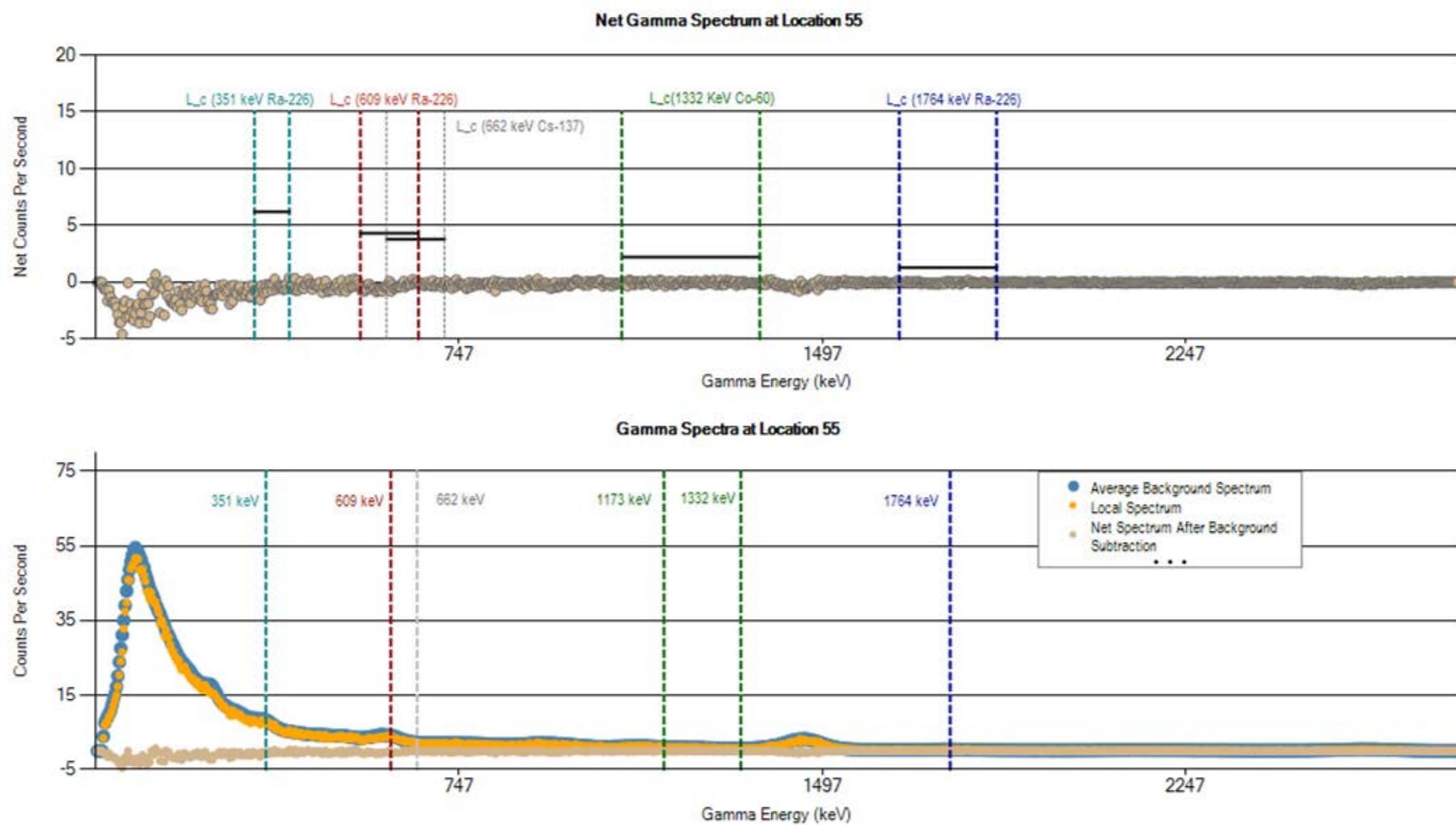
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 52 (cps)	814	107	20	19	144	135	105	166	86	3404
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



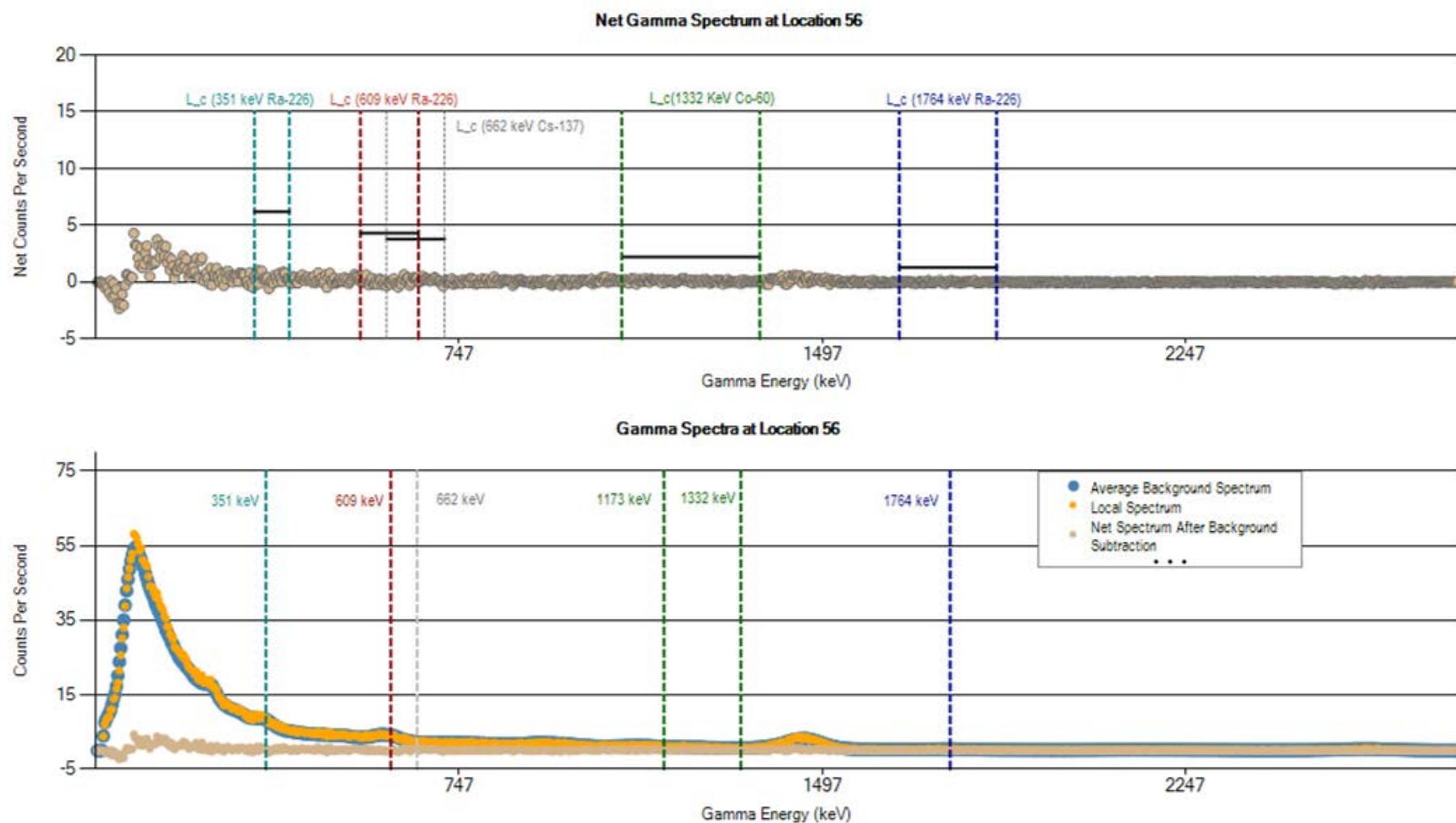
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 53 (cps)	798	106	19	19	142	130	104	166	86	3397
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



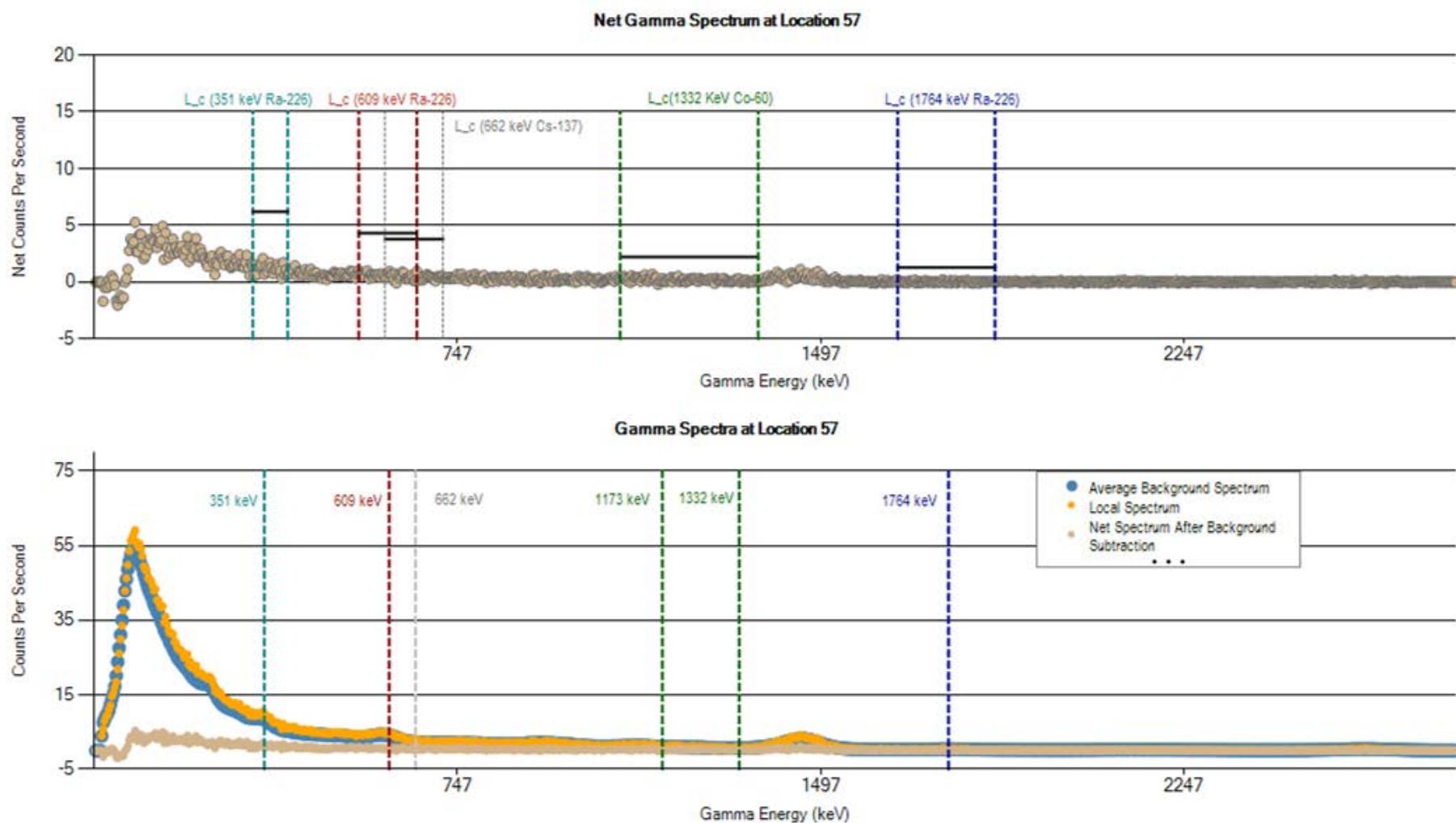
	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 54 (cps)	1044	142	24	27	185	170	131	212	114	4154
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



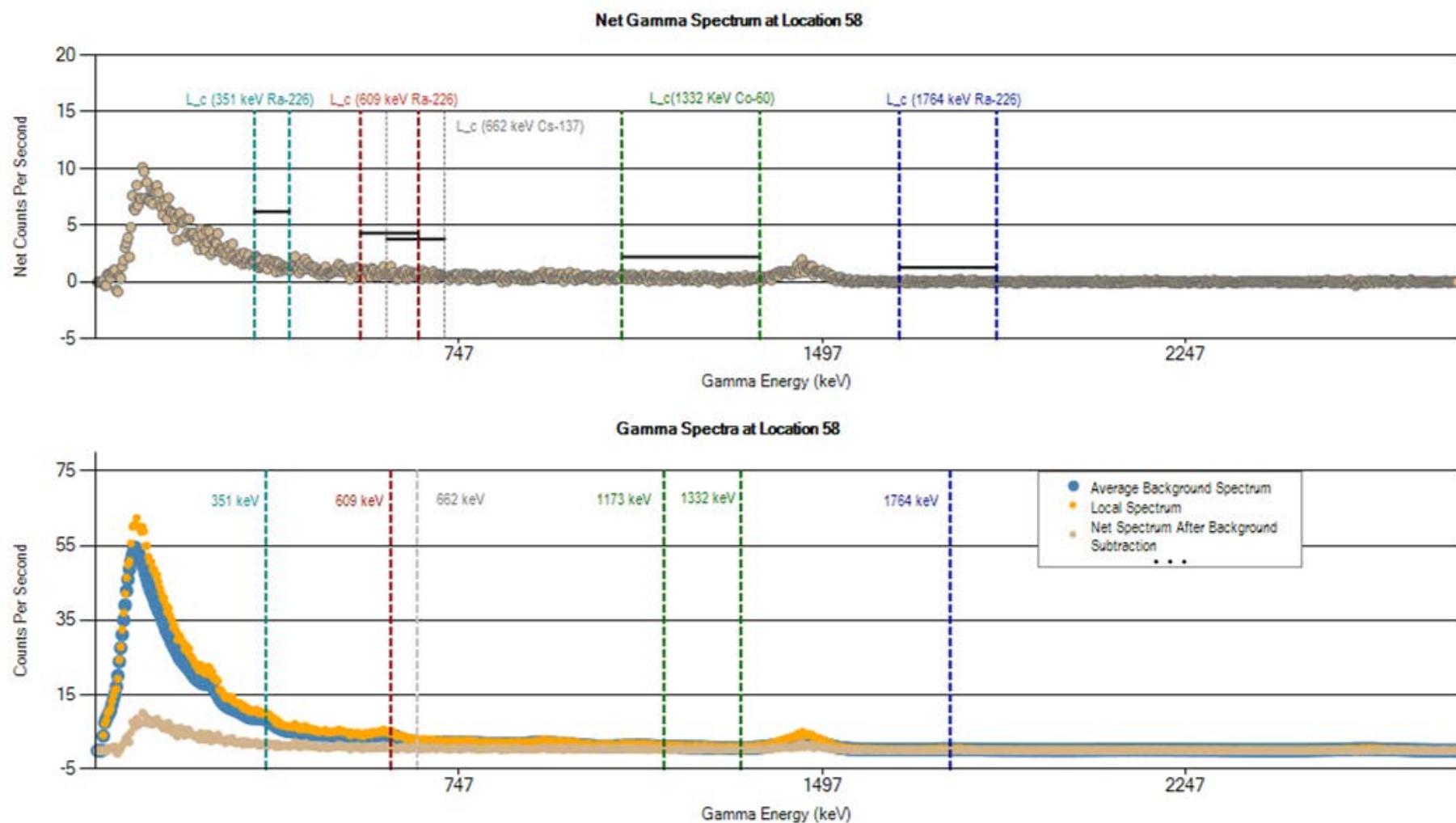
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 55 (cps)	770	103	18	18	136	125	99	162	84	3367
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 56 (cps)	895	125	20	23	159	143	112	182	97	3753
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



	ROI 1	ROI 2	ROI 3	ROI 4	ROI 5	ROI 6	ROI 7	ROI 8	ROI 9	ROI 10
Location 57 (cps)	999	136	22	25	176	163	126	203	108	4001
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 58 (cps)	1081	159	23	26	187	171	133	212	120	4305
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255

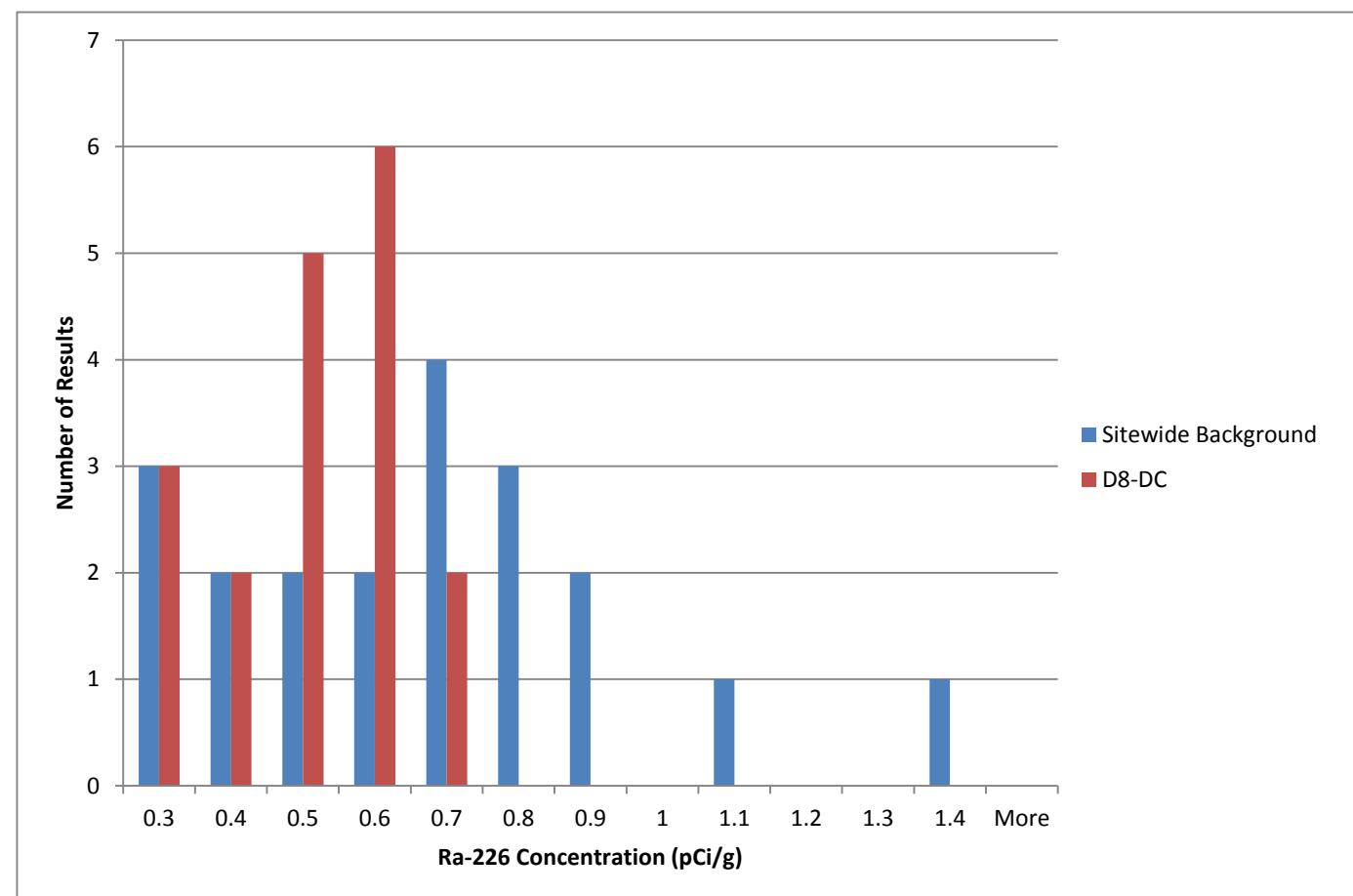
Histogram, RSY D8 (DC) vs. Sitewide Background

Background

Bin	Frequency
0.3	3
0.4	2
0.5	2
0.6	2
0.7	4
0.8	3
0.9	2
1	0
1.1	1
1.2	0
1.3	0
1.4	1
More	0

D8-DC

Bin	Frequency
0.3	3
0.4	2
0.5	5
0.6	6
0.7	2
0.8	0
0.9	0
1	0
1.1	0
1.2	0
1.3	0
1.4	0
More	0



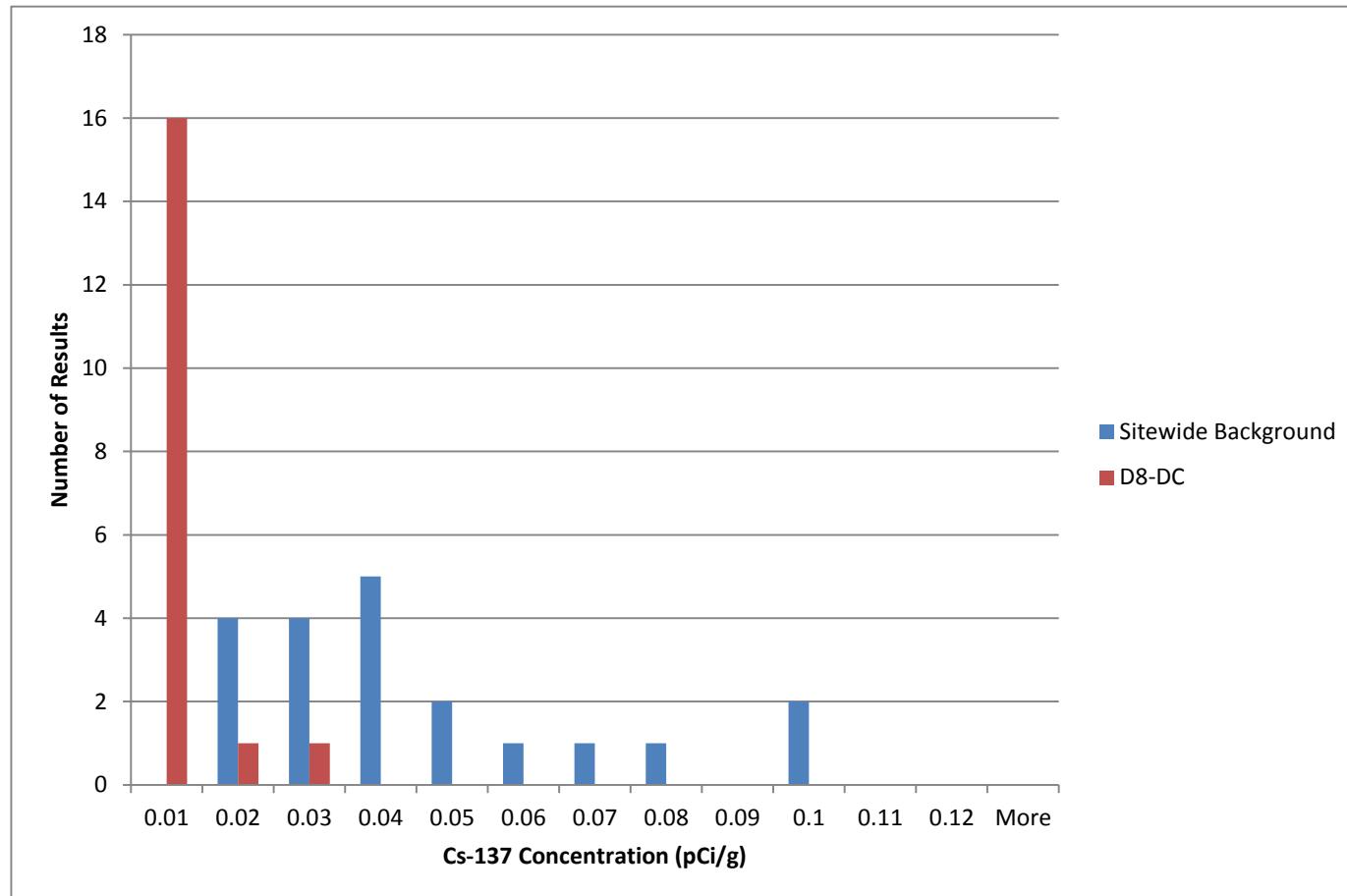
Histogram, RSY D8 (DC) vs. Sitewide Background

Background

Bin	Frequency
0.01	0
0.02	4
0.03	4
0.04	5
0.05	2
0.06	1
0.07	1
0.08	1
0.09	0
0.1	2
0.11	0
0.12	0
More	0

D8-DC

Bin	Frequency
0.01	16
0.02	1
0.03	1
0.04	0
0.05	0
0.06	0
0.07	0
0.08	0
0.09	0
0.1	0
0.11	0
0.12	0
More	0



TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

TestAmerica Job ID: 160-30230-2

Client Project/Site: Hunters Point Naval Shipyard - Parcel E2

For:

Aptim Federal Services LLC
4005 Port Chicago Hwy, Suite 200
Concord, California 94520

Attn: Eddie Kalombo

micha korinhizer

Authorized for release by:

9/11/2018 3:34:39 PM

Micha Korinhizer, Project Management Assistant II
(314)298-8566

micha.korinhizer@testamericainc.com

Designee for

Rhonda Ridenhower, Manager of Project Management
(314)298-8566

rhonda.ridenhower@testamericainc.com

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

1

2

3

4

5

6

7

8

9

10

11

12

Table of Contents

Cover Page	1
Table of Contents	2
Case Narrative	3
Chain of Custody	5
Receipt Checklists	7
Definitions/Glossary	8
Method Summary	9
Sample Summary	10
Client Sample Results	11
QC Sample Results	21
QC Association Summary	23
Tracer Carrier Summary	24

1
2
3
4
5
6
7
8
9
10
11
12

Case Narrative

Client: Optim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30230-2

Job ID: 160-30230-2

Laboratory: TestAmerica St. Louis

Narrative

CASE NARRATIVE

Client: Optim Federal Services LLC

Project: Hunters Point Naval Shipyard - Parcel E2

Report Number: 160-30230-2

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica St. Louis attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client.

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

The following clean-up methods for Organic analyses may have been used on the samples in this data set. Specific methods employed are documented on the batch extraction logs:

Method 3600C: Cleanup

Method 3620C: Florisil Cleanup

Method 3630C: Silica Gel Cleanup

Method 3640A: Gel-Permeation Cleanup

Method 3650B: Acid-Base Partition Cleanup

Method 3660B: Sulfur Cleanup

Method 3665A: Sulfuric Acid/Permanganate Cleanup

Case Narrative

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30230-2

Job ID: 160-30230-2 (Continued)

Laboratory: TestAmerica St. Louis (Continued)

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

RECEIPT

The samples were received on 08/17/2018; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 18.0° C.

TOTAL BETA STRONTIUM (GFPC)

Samples PE2-RSYD8-DC-S001 (160-30230-1) and PE2-RSYD8-DC-S011 (160-30230-11) were analyzed for Total Beta Strontium (GFPC) in accordance with EPA 905. The samples were dried on 08/17/2018, prepared on 08/23/2018 and analyzed on 09/10/2018.

The following samples in batch 160-384836 could not be thoroughly homogenized before sub-sampling was performed due to sample matrix: PE2-RSYD8-DC-S001 (160-30230-1) and PE2-RSYD8-DC-S011 (160-30230-11). The samples contained detritus material and rocks of varying sizes.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Samples PE2-RSYD8-DC-S001 (160-30230-1), PE2-RSYD8-DC-S002 (160-30230-2), PE2-RSYD8-DC-S003 (160-30230-3), PE2-RSYD8-DC-S004 (160-30230-4), PE2-RSYD8-DC-S005 (160-30230-5), PE2-RSYD8-DC-S006 (160-30230-6), PE2-RSYD8-DC-S007 (160-30230-7), PE2-RSYD8-DC-S008 (160-30230-8), PE2-RSYD8-DC-S009 (160-30230-9), PE2-RSYD8-DC-S010 (160-30230-10), PE2-RSYD8-DC-S011 (160-30230-11), PE2-RSYD8-DC-S012 (160-30230-12), PE2-RSYD8-DC-S013 (160-30230-13), PE2-RSYD8-DC-S014 (160-30230-14), PE2-RSYD8-DC-S015 (160-30230-15), PE2-RSYD8-DC-S016 (160-30230-16), PE2-RSYD8-DC-S017 (160-30230-17) and PE2-RSYD8-DC-S018 (160-30230-18) were analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA_01_R. The samples were dried on 08/17/2018, prepared on 08/20/2018 and analyzed on 09/10/2018.

The cesium-137 detection goal of 0.0700 pCi/g was not met for samples PE2-RSYD8-DC-S001 (160-30230-1), PE2-RSYD8-DC-S004 (160-30230-4), PE2-RSYD8-DC-S005 (160-30230-5) and PE2-RSYD8-DC-S011 (160-30230-11) in batch 160-384125. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

CHAIN OF CUSTODY

APTIM Federal Services, LLC
4005 Port Chicago Hwy
Concord, CA 94520

Ref. Document # PE2_RSYD8_DC#572

Page 2 of 2

Analyses Requested										
Strontium 90 (EPA 905 MOD)										
Total Strontium (EPA 905 MOD)										
Gamma Spec (EPA 1911M) - (7 day-in-growth preliminary results and full 21 day in-growth for full gamma results)										
Strontium 90 (EPA 905 MOD)										
Dose Rate $\mu\text{R/Hr}$										
Shipment/Pickup Date:	8.16.18									
Waybill Number:	12661545130245031									
Project Name:	CTO-013 RSYD8 Deconstruction Systematic									
Project Location:	HPNS - Parcel E-2									
Purchase Order #:	202296									
Lab Destination:	TestAmerica (St. Louis Lab) 13715 Rider Trail North Earth City, MO 63045									
Lab Contact Name / ph. #:	Rhonda Ridenhower (314) 298-8566									
Collection Information	Date	Time	Method	Matrix	# Containers	Preservative (water)	Preservative (soil)	N/A	N/A	
Sample ID Number	Sample Description		Date	Time	Method	Container Type				
PE2-RSYD8-DC-S011	Parcel E-2 RSYD8 Deconstruction Systematic		8/10/18	10:00	G	SO	1	16 oz. plastic jar	X	X
PE2-RSYD8-DC-S012	Parcel E-2 RSYD8 Deconstruction Systematic		8/10/18	10:17	G	SO	1	16 oz. plastic jar	X	X
PE2-RSYD8-DC-S013	Parcel E-2 RSYD8 Deconstruction Systematic		8/10/18	10:25	G	SO	1	16 oz. plastic jar	X	X
PE2-RSYD8-DC-S014	Parcel E-2 RSYD8 Deconstruction Systematic		8/10/18	10:33	G	SO	1	16 oz. plastic jar	X	X
PE2-RSYD8-DC-S015	Parcel E-2 RSYD8 Deconstruction Systematic		8/10/18	10:40	G	SO	1	16 oz. plastic jar	X	X
PE2-RSYD8-DC-S016	Parcel E-2 RSYD8 Deconstruction Systematic		8/10/18	10:47	G	SO	1	16 oz. plastic jar	X	X
PE2-RSYD8-DC-S017	Parcel E-2 RSYD8 Deconstruction Systematic		8/10/18	10:55	G	SO	1	16 oz. plastic jar	X	X
PE2-RSYD8-DC-S018	Parcel E-2 RSYD8 Deconstruction Systematic		8/10/18	11:03	G	SO	1	16 oz. plastic jar	X	X
Special Instructions: Analyze for Total Strontium as a screening step, and isotopic Sr-90 only if Total Strontium is above project action limit of 0.331 pCi/g. 7 days ingrown draft and follow with 21 days final.										
<input type="checkbox"/> 24-hr <input type="checkbox"/> 3-day <input type="checkbox"/> 10-day <input type="checkbox"/> Project Specific:										
Standard TAT -10-day	Level Of QC Required:									
Relinquished By: <i>Jordan Ramatz</i>	Date: 8.16.18	Received By: <i>Eddie Kalonitz</i>	Date: 8.16.18	Method Codes: 0830	C = Composite	G = Grab				
Relinquished By: <i>Eddie Kalonitz</i>	Date: 8.16.18	Received By: <i>John Schlosser</i>	Date: 8.17.18	Matrix Codes: 0830	DW = Drinking Water	SO = Soil				
Relinquished By:	Date: 8.16.18	Received By:	Date: 8.17.18		GW = Ground Water	SL = Sludge				
Relinquished By:	Date: 8.16.18	Received By:	Date: 8.17.18		WW = Waste Water	CP = Chip Samples				
					A = Air	ABS=Asbestos, PO=Pipe Opening				

1
2
3
4
5
6
7
8
9
10
11
12

Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-30230-2

Login Number: 30230**List Source: TestAmerica St. Louis****List Number: 1****Creator: Press, Nicholas B**

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Client: Aptim Federal Services LLC
 Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30230-2

Qualifiers

Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

Glossary

Abbreviation **These commonly used abbreviations may or may not be present in this report.**

□	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Method Summary

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30230-2

Method	Method Description	Protocol	Laboratory
905.0	Total Beta Strontium (GFPC)	DOE	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-0	Preparation, Digestion/ Precipitate	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

Protocol References:

DOE = U.S. Department of Energy

None = None

Laboratory References:

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

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2

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4

5

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8

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12

Sample Summary

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30230-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-30230-1	PE2-RSYD8-DC-S001	Solid	08/10/18 08:50	08/17/18 08:30
160-30230-2	PE2-RSYD8-DC-S002	Solid	08/10/18 08:57	08/17/18 08:30
160-30230-3	PE2-RSYD8-DC-S003	Solid	08/10/18 09:03	08/17/18 08:30
160-30230-4	PE2-RSYD8-DC-S004	Solid	08/10/18 09:10	08/17/18 08:30
160-30230-5	PE2-RSYD8-DC-S005	Solid	08/10/18 09:18	08/17/18 08:30
160-30230-6	PE2-RSYD8-DC-S006	Solid	08/10/18 09:35	08/17/18 08:30
160-30230-7	PE2-RSYD8-DC-S007	Solid	08/10/18 09:42	08/17/18 08:30
160-30230-8	PE2-RSYD8-DC-S008	Solid	08/10/18 09:49	08/17/18 08:30
160-30230-9	PE2-RSYD8-DC-S009	Solid	08/10/18 09:56	08/17/18 08:30
160-30230-10	PE2-RSYD8-DC-S010	Solid	08/10/18 10:03	08/17/18 08:30
160-30230-11	PE2-RSYD8-DC-S011	Solid	08/10/18 10:10	08/17/18 08:30
160-30230-12	PE2-RSYD8-DC-S012	Solid	08/10/18 10:17	08/17/18 08:30
160-30230-13	PE2-RSYD8-DC-S013	Solid	08/10/18 10:25	08/17/18 08:30
160-30230-14	PE2-RSYD8-DC-S014	Solid	08/10/18 10:33	08/17/18 08:30
160-30230-15	PE2-RSYD8-DC-S015	Solid	08/10/18 10:40	08/17/18 08:30
160-30230-16	PE2-RSYD8-DC-S016	Solid	08/10/18 10:47	08/17/18 08:30
160-30230-17	PE2-RSYD8-DC-S017	Solid	08/10/18 10:55	08/17/18 08:30
160-30230-18	PE2-RSYD8-DC-S018	Solid	08/10/18 11:03	08/17/18 08:30

Tracer/Carrier Summary

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30230-2

Method: 905.0 - Total Beta Strontium (GFPC)**Matrix: Solid****Prep Type: Total/NA****Percent Yield (Acceptance Limits)**

Lab Sample ID	Client Sample ID	Sr Carrier (40-110)										
160-30230-1	PE2-RSYD8-DC-S001	74.3										
160-30230-11	PE2-RSYD8-DC-S011	76.0										
LCS 160-384836/1-A	Lab Control Sample	86.7										
MB 160-384836/13-A	Method Blank	84.7										

Tracer/Carrier Legend

Sr Carrier = Sr Carrier

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11

12



ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

TestAmerica Job ID: 160-30414-2

Client Project/Site: Hunters Point Naval Shipyard - Parcel E2

For:

Aptim Federal Services LLC
4005 Port Chicago Hwy, Suite 200
Concord, California 94520

Attn: Eddie Kalombo

Rhonda Ridenhower

Authorized for release by:

9/25/2018 3:55:11 PM

Rhonda Ridenhower, Manager of Project Management
(314)298-8566

rhonda.ridenhower@testamericainc.com

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Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Cover Page	1
Table of Contents	2
Case Narrative	3
Chain of Custody	5
Receipt Checklists	6
Definitions/Glossary	7
Method Summary	8
Sample Summary	9
Client Sample Results	10
QC Sample Results	13
QC Association Summary	14

Case Narrative

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30414-2

Job ID: 160-30414-2

Laboratory: TestAmerica St. Louis

Narrative

CASE NARRATIVE

Client: Aptim Federal Services LLC

Project: Hunters Point Naval Shipyard - Parcel E2

Report Number: 160-30414-2

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica St. Louis attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an ""as received"" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

RECEIPT

The samples were received on 08/28/2018; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 20.6 C.

RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Samples PE2-RSYD8-DC-B-S001 (160-30414-1), PE2-RSYD8-DC-B-S002 (160-30414-2), PE2-RSYD8-DC-B-S003 (160-30414-3), PE2-RSYD8-DC-B-S004 (160-30414-4) and PE2-RSYD8-DC-B-S005 (160-30414-5) were analyzed for Radium-226 by gamma spec (21

Case Narrative

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30414-2

Job ID: 160-30414-2 (Continued)

Laboratory: TestAmerica St. Louis (Continued)

day ingrowth) in accordance with EPA GA_01_R. The samples were dried on 08/28/2018, prepared on 08/30/2018 and analyzed on 09/20/2018 and 09/24/2018.

The cesium-137 detection goal of 0.0700 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline.
PE2-RSYD8-DC-B-S005 (160-30414-5)

The following sample exhibited a negative result greater in magnitude than the 3 sigma TPU: PE2-RSYD8-DC-B-S005 (160-30414-5) This occurrence was evaluated and determined to be random in nature. Sporadic occurrences such as this are statistically expected. No further action is required.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



CHAIN OF CUSTODY

APTIM Federal Services, LLC
4005 Port Chicago Hwy
Concord, CA 94520

Ref. Document # PE2_RSYD8_DC_BIASED#613
Page 1 of 1

Analyses Requested						
Strontium 90 (EPA 905 MOD)						
Total Strontium (EPA 905 MOD)						
Gamma Spec (EPA 1911 M) - (7 day-in-growth preminary results and full 21 day in growth for full gamma results)						
Preservative (water)						
Collection Information			Preservative (soil)			
Sample ID Number	Sample Description	Date	Time	Method	Matrix	Container Type
PE2-RSYD8-DC-B-S001	Parcel E-2 RSYD8 Biased	8/22/18	13:07	G	SO	16 oz. plastic jar
PE2-RSYD8-DC-B-S002	Parcel E-2 RSYD8 Biased	8/22/18	12:50	G	SO	16 oz. plastic jar
PE2-RSYD8-DC-B-S003	Parcel E-2 RSYD8 Biased	8/22/18	12:54	G	SO	16 oz. plastic jar
PE2-RSYD8-DC-B-S004	Parcel E-2 RSYD8 Biased	8/22/18	13:11	G	SO	16 oz. plastic jar
PE2-RSYD8-DC-B-S005	Parcel E-2 RSYD8 Biased	8/22/18	12:59	G	SO	16 oz. plastic jar
Special Instructions:						
Analyze for Total Strontium as a screening step, and isotopic Sr-90 only if Total Strontium is above project action limit, 7 days ingrown draft and follow with 21 days final.						
Level Of QC Required:						
<input type="checkbox"/> 24-hr		<input type="checkbox"/> 3-day		<input type="checkbox"/> 10-day		<input type="checkbox"/> I <input type="checkbox"/> II <input checked="" type="checkbox"/> III Project Specific:
Standard TAT - 10-day						
Reinquished By: <i>H. N. H. S. E. L. C. H.</i>	Date: 8/22/18		Received By: <i>Eddie Kalanoo</i>		Date: 8/22/18	
Reinquished By: <i>Eddie Kalanoo</i>	Time: 13:30		Received By: <i>Nicholas Penn</i>		Time: 13:30	
Reinquished By: <i>Eddie Kalanoo</i>	Date: 8/21/18		Received By: <i>Nicholas Penn</i>		Date: 8/21/18	
Reinquished By: <i>Eddie Kalanoo</i>	Time: 16:00		Received By: <i>Nicholas Penn</i>		Time: 08:30	

Method Codes	C = Composite	G = Grab
Matrix Codes	DW = Drinking Water	SO = Soil
	GW = Ground Water	SL = Sludge
	WW = Waste Water	CP = Chip Samples
	A = Air	ABS=Asbestos, PO=Pipe Opening

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Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-30414-2

Login Number: 30414**List Source: TestAmerica St. Louis****List Number: 1****Creator: Press, Nicholas B**

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Client: Aptim Federal Services LLC
 Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30414-2

Qualifiers

Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

Glossary

Abbreviation

These commonly used abbreviations may or may not be present in this report.

□	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Method Summary

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30414-2

Method	Method Description	Protocol	Laboratory
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

Protocol References:

DOE = U.S. Department of Energy

None = None

Laboratory References:

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

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Sample Summary

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30414-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-30414-1	PE2-RSYD8-DC-B-S001	Solid	08/22/18 13:07	08/28/18 08:30
160-30414-2	PE2-RSYD8-DC-B-S002	Solid	08/22/18 12:50	08/28/18 08:30
160-30414-3	PE2-RSYD8-DC-B-S003	Solid	08/22/18 12:54	08/28/18 08:30
160-30414-4	PE2-RSYD8-DC-B-S004	Solid	08/22/18 13:11	08/28/18 08:30
160-30414-5	PE2-RSYD8-DC-B-S005	Solid	08/22/18 12:59	08/28/18 08:30

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Client Sample Results

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30414-2

Client Sample ID: PE2-RSYD8-DC-B-S005**Lab Sample ID: 160-30414-5****Date Collected: 08/22/18 12:59****Matrix: Solid****Date Received: 08/28/18 08:30****Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	1.02		0.213	0.237		0.0701	pCi/g	08/30/18 10:55	09/20/18 19:57	1
Actinium-227	0.203	U	0.506	0.506		0.357	pCi/g	08/30/18 10:55	09/20/18 19:57	1
Bismuth-212	1.76		0.594	0.621		0.117	pCi/g	08/30/18 10:55	09/20/18 19:57	1
Bismuth-214	0.850		0.198	0.217		0.0696	pCi/g	08/30/18 10:55	09/20/18 19:57	1
Cesium-137	-0.0303	U	0.115	0.115	0.0700	0.0744	pCi/g	08/30/18 10:55	09/20/18 19:57	1
Cobalt-60	-0.0199	U	0.0969	0.0969	0.200	0.0469	pCi/g	08/30/18 10:55	09/20/18 19:57	1
Lead-210	0.444	U	1.86	1.86		1.25	pCi/g	08/30/18 10:55	09/20/18 19:57	1
Lead-212	0.781		0.134	0.157		0.0655	pCi/g	08/30/18 10:55	09/20/18 19:57	1
Lead-214	0.860		0.171	0.192		0.0728	pCi/g	08/30/18 10:55	09/20/18 19:57	1
Potassium-40	19.8		2.24	3.00		0.380	pCi/g	08/30/18 10:55	09/20/18 19:57	1
Protactinium-231	0.000	U	0.654	0.654		2.58	pCi/g	08/30/18 10:55	09/20/18 19:57	1
Radium-226	0.850		0.198	0.217	0.700	0.0696	pCi/g	08/30/18 10:55	09/20/18 19:57	1
Radium-228	1.02		0.213	0.237		0.0701	pCi/g	08/30/18 10:55	09/20/18 19:57	1
Thallium-208	0.351		0.0864	0.0935		0.0240	pCi/g	08/30/18 10:55	09/20/18 19:57	1
Thorium-228	0.781		0.134	0.157		0.0655	pCi/g	08/30/18 10:55	09/20/18 19:57	1
Thorium-232	1.02		0.213	0.237		0.0701	pCi/g	08/30/18 10:55	09/20/18 19:57	1
Thorium-234	-1.14	U	0.749	0.759		1.73	pCi/g	08/30/18 10:55	09/20/18 19:57	1
Uranium-235	0.264	U	0.578	0.579		0.580	pCi/g	08/30/18 10:55	09/20/18 19:57	1
Uranium-238	-1.14	U	0.749	0.759		1.73	pCi/g	08/30/18 10:55	09/20/18 19:57	1

QC Association Summary

Client: Aptim Federal Services LLC

Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30414-2

Rad**Leach Batch: 385948**

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-30414-1	PE2-RSYD8-DC-B-S001	Total/NA	Solid	Dry and Grind	
160-30414-2	PE2-RSYD8-DC-B-S002	Total/NA	Solid	Dry and Grind	
160-30414-3	PE2-RSYD8-DC-B-S003	Total/NA	Solid	Dry and Grind	
160-30414-4	PE2-RSYD8-DC-B-S004	Total/NA	Solid	Dry and Grind	
160-30414-5	PE2-RSYD8-DC-B-S005	Total/NA	Solid	Dry and Grind	

Prep Batch: 386205

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-30414-1	PE2-RSYD8-DC-B-S001	Total/NA	Solid	Fill_Geo-21	385948
160-30414-2	PE2-RSYD8-DC-B-S002	Total/NA	Solid	Fill_Geo-21	385948
160-30414-3	PE2-RSYD8-DC-B-S003	Total/NA	Solid	Fill_Geo-21	385948
160-30414-4	PE2-RSYD8-DC-B-S004	Total/NA	Solid	Fill_Geo-21	385948
160-30414-5	PE2-RSYD8-DC-B-S005	Total/NA	Solid	Fill_Geo-21	385948
MB 160-386205/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-386205/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	